AMERICAN SOCIETY FOR TESTING MATERIALS

BULLETIN

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"Promotion of Knowledge of Materials of Engineering and Standardization of Specifications and Methods of Testing"

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Interesting Technical Program and Extensive Standardization Work Mark 1936 Annual Meeting

Sessions Featured by Important Contributions; Committees Recommend Many New Standards

If a record-breaking attendance, a great many actions on proposed new standards and adoption of existing specifications as standards, a number of outstanding sessions and intense activity on the part of Society committees are features which make an outstanding and successful meeting, then it can be said that the 1936 (Thirty-ninth) A.S.T.M. Annual Meeting held at Chalfonte-Haddon Hall in Atlantic City, June 29 to July 3, was indeed a most successful one.

Many of the technical papers and reports presented were of outstanding significance and the two main technical features of the meeting, namely, the Symposium on Radiography and X-ray Diffraction Methods and the Symposium on the Limitations of Laboratory and Service Tests in Evaluating Rubber Products were acclaimed by those participating in the meeting.

NEW OFFICERS

A. C. Fieldner

T. G. Delbridge

In view of the appearance this year of the triennial Book of Standards, many of the committees concentrated during the year on the review of the many tentative specifications and tests in their charge looking toward their adoption as standard. A large number of recommendations involving standards were approved at the various annual meeting sessions as a consequence.

During the week of the annual meeting there were about 175 committee meetings at which many important projects were discussed. A brief statement of some current committee standardization activities appears later in this BULLETIN and in the October issue it is planned to present the usual review of research activities, summarizing the major investigational programs under way.

At the eighteen formal sessions held during the meeting, 51 reports of A.S.T.M. standing committees and others of which the Society is sponsor were presented. Including the twelve papers comprising the Symposium on Radiography and X-ray Diffraction Methods and the five in the Symposium on Evaluating Rubber Products, there were a total of 61 papers presented. In addition to these, there were nine papers dealing with important aspects of committee activities that were appended to the committee reports and presented at the meeting. A large number of the items on the program were preprinted, and some idea of the volume is indicated by the fact that the pages set in type and preprinted totaled 1125.

In addition to the formal sessions, there was a Conference on Effect of Humidity and Temperature Conditions on Properties of Materials held under the auspices of Committee E-1 on Methods of Testing which provided an opportunity for an exchange of views and for a general discussion of the problems involved. Increasing interest is being taken in questions dealing with the effects of humidity and temperature conditions on the properties of materials and certain of the Society committees have been considering the conditioning of materials and the establishing of standard atmospheric test conditions.

The total registration for the week reached 1131, consisting of 757 members, 143 committee members representing company memberships, and 231 visitors. The meeting goes on record as having the largest attendance of any except the 1931 meeting which was held in Chicago. The registration of 1451 at this latter meeting should not be considered a normal attendance because of the large number of visitors, many of whom were drawn by the First A.S.T.M. Exhibit,

and by the extensive Symposium on Effect of Temperature on the Properties of Metals sponsored by the Society and the A.S.M.E. The previous high, Atlantic City in 1930, was 1092, while the 1935 registration in Detroit was 1012. A large number of the members brought their families with them and 256 ladies registered at the meeting.

OPENING SESSION—PRESIDENT'S ADDRESS

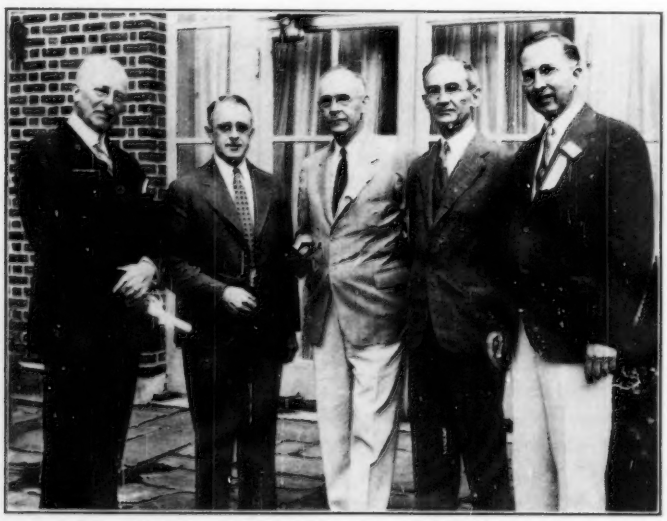
The first formal session of the meeting held on Tuesday morning was featured by the annual address of the retiring president, H. S. Vassar, and an address on "Relationship of A.S.T.M. to Modern Developments in Chemical Engineering," by Dr. H. C. Parmelee, Editor, *Engineering and Mining Journal,* McGraw-Hill Publishing Co. This latter address was very favorably received and is published in this BULLETIN, beginning on page 7.

Mr. Vassar's address was unusual in that it dealt with "The Testing of Non-Materials." Mr. Vassar considered "our approach to the numerous problems which have to do with satisfactory living and which so vitally concern each of us." Among the problems he touched briefly on were unemployment, labor, and the fomenting of hatreds. He pointed out that "we have in this country several hundred associations of specialists in science and technology, with an aggregate membership of hundreds of thousands. In the treatment of the physical problems in their respective fields, a reasonably successful technique has been developed. If you like you may call this 'the scientific approach' but perhaps 'common sense' would be just as good a name. Unless we are willing to admit the truth of the charge that we have degenerated into a nation of cynical materialists, devoid of those characteristics of our forefathers of which we boast, is there any valid reason for abandoning our methods of approach when stepping as we must, from our vocation into the non-materials field?

"It has been said that a few thousand people are sufficient at any time to change the thinking of America. If this is true, there is within the organized workers in the field of physical science a potential force fully capable of being the leaven in the meal of society, which can aid mightily in the development of a more rational approach to the problems of the day."

He further pointed out that "as members of A.S.T.M. we would laugh at the suggestion that in attacking a new and controversial subject in one of our standing committees, we at once plunge into a battle of words on the most disputed points, without first having established a common ground made up of those things upon which we have found ourselves already in fair agreement. Yet is it not too frequently considered quite proper to initiate the consideration of a social question with a battle of words?"

In concluding, he stated that "on this coming celebration of Independence Day we again will be asked to remember those men of 1776 who sacrificed their comfort, their possessions, and in many cases, their lives in the common interest. The challenge that comes to Americans in 1936 is less spectacular. It may not be a call to physical combat but it does demand honest, intelligent, and unselfish thinking as each one does his part in bringing adequate standards to the testing of non-materials." This address will be printed in full in the 1936 *Proceedings.*



President Vassar (center) awarding Dudley Medal to H. C. Mann, with Doctor Day (holding his Marburg Lecture Certificate), Doctor Parmelee (at Mr. Vassar's left) and Secretary-Treasurer Warwick. *(Editor's Note.—Doctor Day, whose lecture was on "Developing American Glass," might consider this picture a good example of the use of optical glass—five pairs of glasses are in evidence.)*

MARBURG LECTURE

A most interesting Marburg Lecture was delivered by Dr. Arthur L. Day, Director, Geophysical Laboratory, Carnegie Institution of Washington on the subject: "Developing American Glass." Doctor Day gave a very able presentation and held the attention of a large audience throughout. The lecture was illustrated by several reels of motion pictures and by a number of interesting slides.

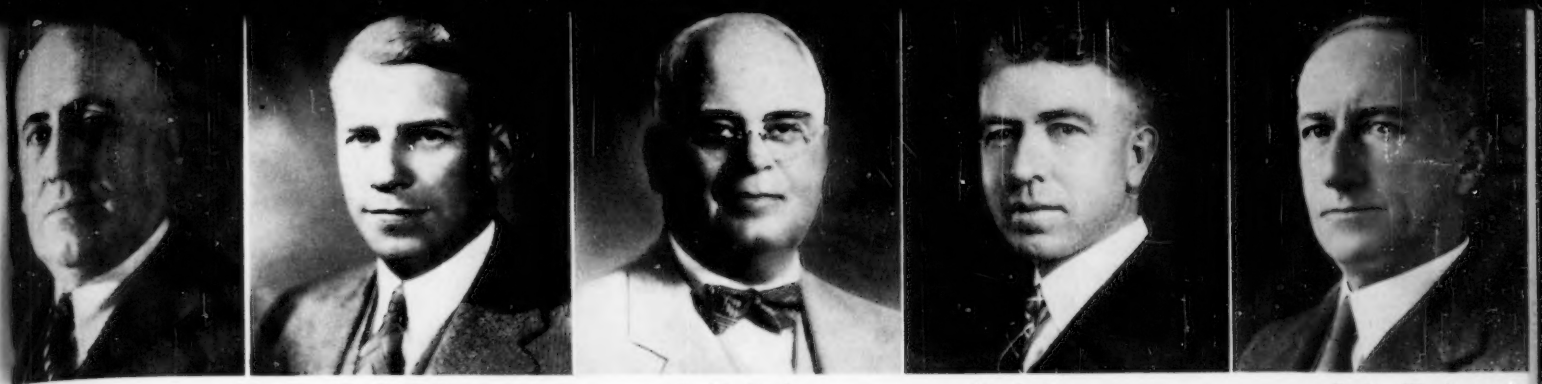
Doctor Day outlined the history of glass development and illustrated particularly contributions which American industry has made in developing glass making processes and machinery, climaxed by the recent successful pouring of the 200-in. diameter telescope lens which is now being ground and polished in California, preparatory to its use in astronomical observations. The lecture stressed the fact that glass manufacturers today offer a number of different compositions, each adapted to a particular purpose. Recent developments of physical tempering of glasses through which a given composition may be made to serve a wide variety of purposes with success were indicated as a most important advance.

DUDLEY MEDAL AWARDED

The Tenth Award of the Charles B. Dudley Medal was made, following the Marburg Lecture, to H. C. Mann, Senior Materials Engineer, Ordnance Dept., Watertown Arsenal, for his paper on "The Relation Between the Tension Static and Dynamic Tests" presented before the Society at the 1935 annual meeting. This award is made to the author or authors of a paper of oustanding merit constituting an original contribution on research in engineering materials. Mr. Mann was educated at Worcester Polytechnic Institute and Boston University and has been at Watertown Arsenal since 1916. He was Research Engineer in charge of the Physical Testing Laboratory from 1928 to 1936.

Considerable interest was evidenced in the paper which Mr. Mann presented at the Atlantic City meeting dealing with "High-Velocity Tension-Impact Tests." This paper

(Continued on page 4)



C. S. Reeve | F. E. Richart | O. U. Cook | H. F. Gonnerman | F. M. Waring

NEW OFFICERS

THE recent election of officers, as announced at the annual meeting by the tellers, Dr. F. R. Baxter and H. G. Burnham, resulted in the unanimous election of A. C. Fieldner as President (1936-1937), T. G. Delbridge as Vice-President (1936-1938) and the following as members of the Executive Committee (1936-1938): O. U. Cook, H. F. Gonnerman, C. S. Reeve, F. E. Richart and F. M. Waring.

PRESIDENT

A. C. Fieldner, the new President, since 1927 Chief Engineer, Experiment Stations Division, U. S. Bureau of Mines, has just been appointed Chief, Technologic Branch, with headquarters in Washington, D. C. Following his graduation in chemical engineering from Ohio State University in 1906, and a short apprenticeship, he became fuels chemist in the U. S. Geological Survey at Pittsburgh, Pa. In 1910, when this work was transferred to the newly created Bureau of Mines, he was placed in charge of the fuels chemical laboratory and later of the gas investigations laboratory also. During the War, he was in charge of the Gas Mask Section, Chemical Warfare Service, and was commissioned a Major. Doctor Fieldner returned to Pittsburgh as supervising chemist of the Pittsburgh Station, and in 1921, was placed in charge of the Station. In 1925 he was appointed chief chemist of the Bureau of Mines, and in 1927, was placed in administrative charge of the Bureau's Experiment Stations Division.

Doctor Fieldner is chairman of A.S.T.M. Committee D-5 on Coal and Coke and D-3 on Gaseous Fuels and of the Sectional Committee on Classification of Coals. He has been chairman of the Chemical Committee of the American Gas Association and of the Gas and Fuel Division of the American Chemical Society.

He is a member of the A.I.M.E., American Chemical Society, American Gas Assn., Coal Mining Institute of America, and American Institute of Chemical Engineers. At the 1936 Commencement Exercises of the University of Alabama, he was awarded the Honorary Degree of Doctor of Science.

VICE-PRESIDENT

T. G. Delbridge, newly elected Vice-President, is Manager, Research and Development Dept., The Atlantic Refining Co., Philadelphia. After his graduation in 1903 from Union College with an A.B. Degree, Doctor Delbridge was instructor in chemistry at Cornell University from 1904 to 1909, where in 1907 he was awarded the degree of Ph.D. He became chemist for The Atlantic Refining Co. and in 1914 was appointed assistant superintendent; in 1918, chief chemist; in 1922, assistant plant manager; and in 1923, became manager, research and development dept., the position he now occupies.

Doctor Delbridge was a member of the A.S.T.M. Executive Committee, 1923-1925, and has been Vice-Chairman of Committee D-2 on Petroleum Products and Lubricants since 1930. He is a member of The Franklin Institute, American Petroleum Institute, and the British Institution of Petroleum Technologists.

MEMBERS OF EXECUTIVE COMMITTEE

O. U. Cook is Assistant Manager, Department of Metallurgy, Inspection and Research, Tennessee Coal, Iron and Railroad Co., Birmingham, Ala. Following his education in the public schools of Rochester, N. Y., and the University of Rochester, Mr. Cook entered the employ of the Carnegie Steel Co. in Pittsburgh in 1904; from 1905 to 1906 he was at Mingo Junction, Ohio. In 1906 he was transferred to Youngstown and served as chief inspector until 1917 when he became inspecting engineer of the Tennessee Coal, Iron and Railroad Co. at Birmingham. Since October, 1935, he has been in his present position. Mr. Cook is president of the American Association of Steel Manufacturers Technical Committees and is a member of the A.R.E.A. and A.S.M.

H. F. Gonnerman, Manager, Research Laboratory, Portland Cement Assn., Chicago, Ill., received his technical education at the University of Illinois, having been awarded the degrees B.S., C.E., 1908, and M.S., 1913. From 1908 to 1920 he was instructor in theoretical and applied mechanics, first assistant, research associate and research assistant professor in the Engineering Experiment Station, University of Illinois. He assisted in the concrete investigations of the U. S. Emergency Fleet Corp., and was in the electric contracting business, 1920-1922. From 1922 to 1927 he was associate engineer, Structural Materials Research Lab., Lewis Institute and Research Lab., Portland Cement Assn., Chicago, and in 1927 he was appointed manager of laboratory, P.C.A., the position he now holds. His memberships include: American Concrete Institute, Western Society of Engineers, and A.S.C.E.

C. S. Reeve is Manager, Research Development, The Barrett Co., Leonia, N. J. After his graduation from the University of Pennsylvania with the degree of B.S. in chemistry, Mr. Reeve was assistant chemist, General Electric Co. and later was engaged on water softening problems for the Industrial Water Co. From 1904 to 1906, while he was with the Bureau of Surveys, City of Philadelphia, he equipped and operated the city's first laboratory for testing asphalt materials. Until 1909 he was assisting inspector of asphalt and cement of the District of Columbia, and then was engaged in testing and research on bituminous road materials, Office of Public Roads, U. S. Department of Agriculture. Since 1918 he has been with The Barrett Co. as director of research on coal tar products and bituminous

materials. In addition to his A.S.T.M. committee work, he has also been active for a number of years on the Preservatives Committee of the American Wood Preservers Association.

F. E. Richart, Research Professor of Engineering Materials, University of Illinois, Urbana, Ill., is a graduate of the University of Illinois, B.S. in Civil Engineering, 1914; M.S., 1915; C.E., 1922. From 1913 to 1917, he was in various engineering positions in the railroad and public utility fields and structural engineer, concrete ship section, Emergency Fleet Corp. Since 1917 he has been in the department of theoretical and applied mechanics at Illinois and beginning in 1926 he has been in charge of the concrete research laboratory and graduate teaching in concrete. Professor Richart is the author of numerous bulletins and papers on cement and concrete, reinforced concrete beams and buildings, combined stresses, indeterminate structures, etc. He is a member of the A.S.C.E., Western Society of Engineers, and American Concrete Institute, being a director of the latter.

F. M. Waring, Engineer of Tests, The Pennsylvania Railroad Co., Altoona, Pa., following his graduation from Virginia Polytechnic Institute, 1898, with the degree of B.S. in Mechanical Engineering, entered the service of the Pennsylvania Railroad and has been with the company continuously since that time. He has served as engineer of tests since 1917 with headquarters at Altoona. Mr. Waring has been very active in the work of the Society and was chairman of A.S.T.M. Committee A-1 on Steel from 1920 to 1926, secretary of Committee D-11 on Rubber Products from 1914 to 1918 and has participated actively in the work of other committees including A-2 on Wrought Iron and C-1 on Cement. He is also active in the work of the Mechanical Division, Association of American Railroads, serving as chairman of its specifications committee.

Successful Annual Meeting

(Continued from page 2)

gave data which indicates that high-velocity tests are essential to reveal the true dynamic properties of materials and described a special machine which was capable of producing velocities up to 1000 ft. per second. It is believed that the investigations reported reveal for the first time the fact that materials possess definite transition velocities which must not be exceeded if normal behavior is to be expected; that the transition velocity factor is a measurable value and can be used in design; and that the development of transition velocity *versus* heat treatment diagrams should facilitate the selection of proper materials to meet service conditions involving a known rate of dynamic loading. Mr. Mann reported that this conclusion appeared justified even though the investigations described entered a new and unexplored field.

SYMPOSIUM ON RADIOGRAPHY AND X-RAY DIFFRACTION METHODS

The extensive Symposium on Radiography and X-ray Diffraction Methods comprising twelve papers presented in four sessions was an unqualified success. This symposium, with the possible exception of the Symposium on Effect of Temperature on the Properties of Metals held in 1931, is the most extensive of any yet sponsored by the Society. Developed by the Subcommittee on X-ray Methods of A.S.T.M. Committee E-4, with Dr. R. F. Mehl, Carnegie Institute of Technology taking the lead, and H. H. Lester, Watertown Arsenal, John T. Norton, Massachusetts Institute of Technology, and other authorities in the field closely cooperating, it is thought to be the first formal symposium held in this country on the subject.

It was pointed out that such symposiums had been held in Germany for some time and had elicited much profitable discussion. Contributions of our country to the art are by no means minor and much of the essential work has been done by Americans, witness the work of Sauveur, Bain, Clark, Davey and others. The present symposium was organized to bring to the testing public a critical account of the methods which are available, discussion of the present status of various testing methods with a critical comparison with other methods and the suggestion of what may lie in the future in this field with the further development of the art.

The various papers comprising the symposium were based on contributions presented at the preliminary symposium conference held in Detroit in 1935 and other material and data known to the authors of the papers. While it was not possible to preprint the papers, extended abstracts furnished by each of the authors were made available.

Consideration is now being given to the publication of the twelve papers, six on radiography and six on X-ray diffraction, together with the extended written and oral discussion presented during the four symposium sessions. It is hoped that there will be sufficiently widespread interest in procuring copies of this book so that the Society's Committee on Papers and Publications will feel justified in issuing the symposium as a special publication.

SYMPOSIUM ON EVALUATING RUBBER PRODUCTS

To the large number of engineers and others interested in the production and use of various types of rubber products, the Symposium on the Limitations of Laboratory and Service Tests in Evaluating Rubber Products sponsored by Committee D-11 was a most interesting and valuable one. The five papers comprising the symposium dealt with tire performance, rubber footwear, automotive rubber parts, rubber hose and belting, and rubber insulated wire and cables.

In the paper on tire testing, the author concluded that road tests, extensive in scope, carefully organized in relation to the type of service for which the product is destined and expertly conducted and analyzed, provide the only sure way whereby the complete and undistorted picture of tire quality can be obtained. In the paper on rubber footwear, it is indicated that both laboratory and service testing are desirable and once service testing has been carried on and laboratory standards established, a high degree of confidence may be placed in the latter for the control of further production. In connection with rubber insulated wires, it was reported that cable manufacturers feel that carefully chosen tests closely simulating service conditions will offer a good measuring stick for predicting the life of a rubber compound under ordinary conditions.

STANDARDIZATION ACCOMPLISHMENTS

As previously indicated, a large number of recommendations involving new standards and existing specifications

and tests were approved at the annual meeting. The number of new specifications approved for publication as tentative was 31. The largest number of actions involved the approval for submission to Society letter ballot for adoption as standard of 76 existing tentative specifications and test methods. This very large number is, of course, attributable to the fact that this is a Book of Standards' year. A large number of revisions in existing standards were approved, as indicated in the table on page 6 which summarizes actions taken at the meeting.

A list of the new tentative standards appears in another part of this BULLETIN and there is enclosed to each member of the Society, a letter ballot covering a large number of actions on standards which are submitted.

FERROUS AND NON-FERROUS METALS

A large number of papers and reports dealing with various topics in the field of ferrous and non-ferrous metals were presented. Possibly the paper of outstanding interest was the one dealing with "Failure of Suspension Bridge Cable Wire" by W. H. Swanger and G. F. Wohlgemuth. This paper describes the studies which had been under way at the Bureau of Standards for a number of years on the failure of the Mt. Hope suspension bridge cable wire.

The original wire brought to a high strength by quenching and tempering was replaced successfully by cold-drawn wire of about the same size, carbon content and strength. Extended hardness, tension and bend tests on wire from the cable checked with original tests and microstudies showed no defective material or faulty heat treatment. Internal fissures were ruled out and thermomagnetic and related studies indicated no change in structure after treatment. Since the failures had occurred at the anchorages, it was evident that the cause of failure must be associated with stress conditions there. Since the cold-drawn wire under the same load did not fail, either stress conditions in the heat-treated wire were different from those imposed upon the cold-drawn wire or the latter was better able to resist stresses which caused failure in the heat-treated material. The results described in the paper showed that both conditions obtained.

Because of the high elastic limit of the heat-treated wire, it was "preformed" so that each wire would "lay dead" against the anchor shoe, with no residual elastic bending stresses. It was found that most of the loops, when hanging free, did *not* have the curvature of the shoes. In fact many of them had reversed curves and when constrained to the shape of the shoe would be subjected to higher elastic bending stresses than if they had not been preformed at all. This condition was a significant factor in the failure of the wire.

The way in which the failed wires were placed on the anchor shoes, the high elastic limit of the material, and the fluctuating loads on the wires while the cables were spun and the bridge structure was being erected combined to produce a *range* of elastic bending stresses in the wires at the anchor shoes. The uniformly fine-grained steel of the wire, surrounded by the brittle, low strength zinc-iron alloy of the galvanized coating, and with numerous surface imperfections acting as points of stress concentration, offered inadequate resistance to the repeated elastic bending stresses. Fatigue fractures originating at the surface of the wires were the result. There was definite evidence that the fibrous structure of the cold-drawn wire tended to turn aside such cracks, whereas the hard fine-grained structure of the heat-treated wire could not act in this way.

Another paper described extended time creep tests at 1000 F. on annealed electric furnace 0.15 per cent carbon steel from which it was concluded that the type of fracture depends on whether the test temperature is above or below the lowest temperature of recrystallization and that spheroidization will occur in plain carbon steel under stress at 1000 F. Remanent strain-hardening is manifested in this steel at 1000 F. only when the time for rupture is short, as in the short-time tension test.

Fatigue studies made on twelve ferrous materials covering a wide range of structure and properties, were described in a paper entitled "Damage and Overstress in the Fatigue of Ferrous Materials." The authors reported that it is possible to establish a zone on the stress-cycle diagram, above the endurance limit, and bounded by a "damage line" with-

Executive Committee Meeting, Atlantic City. Reading from left to right (clockwise)—Vice-President-elect Delbridge; Messrs. Reeve, Mochel, Gonnerman, Anderson; President-elect Fieldner; H. J. Ball; Past-Presidents Von Schrenk, Lawson and Chapman; President Vassar; Secretary-Treasurer Warwick; Assistant Secretary Hess; Assistant Treasurer Rittenhouse; Messrs. Rather, Graves, Hallett; Vice-President White; Messrs. Morgan, Waring, Marsh and Cook. W. M. Barr, W. R. Webster and F. E. Richart are absent.

in which no damage is done to the specimen as indicated by its ability to run subsequently at the endurance limit for an indefinite number of cycles.

A paper on "Flexure and Torsion Testing of Copper Wire" indicated that the torsion test offered a consistent and accurate method of determining hardness of wire, especially where tension and elongation tests are not sufficiently sensitive. The paper on ductility testing of aluminum and aluminum alloy sheet discussed various types of tests and indicated that no one or any combination of them appears to yield a general quality factor indicating by a single number the quality of the metal in the light of all of the varied definitions of ductility.

An interesting paper dealing with high-strength Monel metal plate indicated that heating to 575 C. and holding for 3 hr. appeared to be suitable treatment for stress relief annealing this material. Extensive data on forming properties of non-ferrous sheet metals were reported in another paper, showing the minimum radii for forming 90-deg. bends in various thicknesses of alloys of brass, bronze, nickel-silver, aluminum, etc.

WATER

The session devoted to four technical papers and the reports of Committee D-19 on Water for Industrial Uses and the Joint Research Committee on Boiler Feed Water Studies was very well attended. Two of the papers prepared in connection with investigations conducted under cooperative agreement between the Joint Research Committee and the U. S. Bureau of Mines dealt with "The Use of Solubility Data to Control the Deposition of Sodium Sulfate or its Complex Salts in Boiler Waters," and the "Effect of Solution Composition on the Failure of Boiler Steel under Static Stress at 250 C."

Extremely interesting curves are included in the former paper, expressing conditions under which sodium sulfate will be deposited during the evaporation of boiler water at given initial composition. These curves were based on the results of an extended investigation of the solubility of sodium sulfate from approximately 300 to 660 F. (150 to 350 C.) in water and in various complex solutions representative of concentrated boiler waters. If further investigation shows that sodium sulfate either in solution or as solid is necessary to prevent embrittlement, these curves will define the conditions which can or should be maintained.

The second paper indicated that pure sodium hydroxide has little effect on the load which a steel specimen will carry, but if the specimen has a line of stress concentration, such as a groove, sodium hydroxide definitely decreases the load-carrying ability. Similarities are shown between hydrogen embrittlement and embrittlement by chemically pure sodium hydroxide solutions. It is shown that sodium sulfite is reduced by iron and hydrogen at 250 C. and that this reduction may explain its influence on the embrittlement reaction as well as offer a new view of its effect in the prevention of corrosion.

Other papers in this session dealt with "The Rate of Reaction of Sodium Sulfite with Oxygen Dissolved in Water" and with the "Determination of Dissolved Oxygen in Boiler Feed Water." The latter paper was a progress report of work under the auspices of the Joint Boiler Feed Water Committee.

CEMENT, LIME AND AGGREGATES

On the recommendation of Committee C-1 on Cement, the annual meeting approved for reference to Society letter ballot, an amendment for immediate incorporation in the specifications for high-early-strength portland cement (C 74), providing that in addition to untreated calcium sulfate and water, there may be added subsequent to calcination, one per cent of other materials provided such materials have been shown not to be harmful by tests prescribed by Committee C-1 and carried out by the Cement Reference Laboratory or other laboratory selected by the committee. These tests are to be made at the expense of the manufacturer. The testing procedure proposed was approved subject to review by the Executive Committee. Concurrent with this action, the committee withdrew its proposal for new specifications covering treated high-early-strength cement. Full details are given in the Summary of *Proceedings*.

A paper dealing with "Petrographic Studies of Hydrated Cements" reported that the strength of portland cement is probably developed by the gel acting as a void-filling glue, rather than by any type of crystallization. Other things being equal, the less calcium hydroxide observed in a thin section, the greater the corresponding strength.

Another interesting paper discussed "Elastic and Thermal Expansion Properties of Concrete as Affected by Similar Properties of the Aggregate" indicating that elastic properties and linear change with temperature of the individual materials in the concrete mixture are not indicative of the results secured with the mixture.

The recommendation of Committee C-7 on Lime that the test procedure for constancy of volume be substituted for the autoclave method of determining soundness was not accepted by the annual meeting and was referred back to the committee for further consideration.

(*Concluded on page 22*)

SUMMARY OF ACTIONS TAKEN AT ANNUAL MEETING AFFECTING STANDARDS AND TENTATIVE STANDARDS

	Existing Tentative Standards Adopted as Standard	Standards in Which Revisions Will Be Adopted	Proposed Standards Approved for Publication as Tentative	Standards Reverted to Tentative Status	Proposed Revisions of Existing Standards Accepted as Tentative	Tentative Standards Revised	Total Standards Adopted	Total Tentative Standards
A. Ferrous Metals—Steel, Cast Iron, Wrought Iron, Alloys, etc.	18	25	11	0	0	3	113	40
B. Non-Ferrous Metals—Copper, Zinc, Lead, Aluminum, Alloys, etc.	3	9	8	0	2	8	71	34
C. Cement, Lime, Gypsum, Concrete and Clay Products	26	5	5	0	1	3	89	33
D. Paints, Petroleum Products, Coal, Textiles, Rubber, etc.	24	26	7	16	4	26	245	139
E. Miscellaneous Subjects, Testing, etc.	5	2	..	0	..	..	15	9
Sectional and Research Committees	..	..	1	..	..	1	1	4
Total	76	67	32	16	7	41	534	259

Relationship of Some Modern Chemical Engineering Developments to the Work of A.S.T.M.

• By H. C. Parmelee[2]

If excuse were needed for bringing this subject to the attention of your Society it can be found in the broad premise that the vigorous research activities that characterize the science of chemistry and its engineering applications are resulting in the production of new materials of construction. In no other field is research more active or being conducted on a broader front. The inevitable result is a host of synthetic products with new properties and characteristics that are rapidly finding industrial application. They are not being offered, as was the custom in earlier days, as substitutes for one material or another, but as new materials entitled in their own right to consideration for the special properties they possess. In the chemical engineering field, at least, the word synthetic no longer connotes an inferior substitute for a genuine article.

Inasmuch as the manufacturing processes in the chemical engineering industries are beset with extraordinary problems of chemical attack on structures and apparatus, many of the new materials of construction have been developed to meet these conditions, and have thus far found their principal applications in the chemical engineering field. But as their properties become more widely known and their cost of production is reduced, they are bound to find wider use. As that time approaches it will be pertinent for your Society to develop appropriate tests and specifications.

The subject is so large and ramifies so widely that I shall confine my attention principally to one group of products popularly known as plastics. These are synthetic organic chemical compounds that can be molded under heat and pressure into forms of varying degrees of physical strength and hardness. Closely related are the solutions of some of these compounds that form lacquers and varnishes. Finally there are rubber-like compounds and rubber derivatives that have been produced in considerable variety.

For convenience the subject will be divided into (1) cellulose derivatives, (2) synthetic resins, and (3) rubber derivatives and rubber-like compounds.

CELLULOSE DERIVATIVES

Cellulose plastics vary in composition and properties depending on the chemical treatment of the base. The oldest and most popularly known is celluloid, a cellulose nitrate. It has not found much use as a material of construction, but has been widely adopted in the fabrication of toilet articles. Its flammability is a distinct liability, and its instability under the action of light has detracted from its earlier use in safety glass.

Cellulose acetate, however, is much less flammable, more stable to light, and possesses other properties that give it preference over the nitrate. It is estimated that last year 85 per cent of the 45,000,000 sq. ft. of safety glass contained cellulose acetate film. In plastic compounds cellulose acetate can be turned, punched or sawed as easily as wood and with the same tools. Strength in resistance to impact, due to its resilience, is the quality that leads to the adoption of this plastic for objects that might be ruined by accidental mishandling or breakage by mechanical stress. Injection molding offers a promising future for this plastic, and it has recently appeared as steering wheels and other forms of automobile hardware. It can be dyed to give all ranges of color, and can be compounded to yield transparent, translucent, or opaque sheets.

Various cellulose ethers have also appeared in the plastic market place, particularly ethyl cellulose. This is notable for its tough, flexible film, even at low temperatures. This makes it a valuable constituent of flexible lacquers and quick-drying varnishes. Owing to its elasticity it requires less plasticizer for molding, and can even be molded without plasticizer. It is chemically inert, resists shock exceptionally well, dissolves in cheap solvents, and ages well under light. This plastic opens an entirely new field in the thermal application, without solvents, of tough plastics to cloth, leather and paper surfaces. Its insulating properties make it a satisfactory cable covering by the extrusion process.

SYNTHETIC RESINS

When we consider the synthetic resins we find a group of products that have found wide industrial use in recent years. As distinguished by their chemical composition the more common forms are referred to as (1) phenolic, (2) urea, (3) vinyl, (4) casein, and (5) acrylic resins.

The phenolic resins are of two types—molded and cast. The production of molded resins last year was 56,000,000 lb., of which 8,000,000 lb. was modified for use as varnish. In cast resins the production was $4\frac{3}{4}$ million pounds, of which 7 per cent was for architectural work.

Molded phenolic resins are used extensively in chemical equipment as sheets, tubes and rods, flanges, couplings, and plug cocks. Tanks and containers of large size and substantial strength are built for special purposes. The material may contain asbestos, canvas or paper as a filler, and may be molded in laminated form or after the added materials have been shredded or macerated. These resins show stability over a wide range of temperature and are unaffected by rapid temperature changes.

Phenolic resins for casting are not mixed with fillers. They are cast as viscous liquids and subjected to slow baking for hardening. They are usually offered for sale as sheets, rods, or tubes in a variety of color effects, from which the finished articles are machined.

Urea resins have not yet found much industrial use. For the most part they have appeared on the market as tableware —plates, cups and saucers—and as buttons and other such articles. Because they are odorless they have found considerable use as closures for bottles and jars in the food and pharmaceutical industries. Large moldings of intricate shape have been made up to 9 lb. in weight for enclosing such objects as counter scales. Moldings have also been made for artistic illuminating effects.

Vinyl resins are comparatively new and are available as

[1] Presented in The Opening Session, 39th ASTM Annual Meeting, Atlantic City.
[2] Editor, *Engineering and Mining Journal*, McGraw-Hill Publishing Co.

molding powder in various colors. This product is tasteless and odorless, has high elasticity and low coefficient of thermal expansion, is unaffected by the actinic rays of sunlight, is resistant to moisture, and can be molded or extruded. The largest single-piece press moldings have been made from this plastic, and in this form it has been used architecturally for doors, panels, floor tile, and other forms of interior finish. Other uses include automobile hardware, dentures, inside coatings for food and beverage cans, and laminated safety glass.

Casein resins, although not new, made relatively little headway in industrial uses until Ford began to exploit the soy bean. This gave a new impetus to the industrial use of casein plastics. When suitably processed by grinding and solvent extraction, the soy bean yields oil and meal—the major part of the meal being casein, from which a plastic resin can be made. No attempt is made to isolate the casein from the cellulose and carbohydrates in the meal, even though a higher grade plastic might thus be made. These constituents of the meal act as a filler and keep down the cost of production. In fact additional filler is used in the form of wood flour. Ford is using casein resins for molding window frames and various items of automobile hardware, and is using soy bean oil in body enamel and in foundry cores. Consumption of these products is running at the rate of 10 to 15 lb. of molded plastics and 5 lb. of oil per car.

Acrylic resins are derivatives of acrylic acid and can be made in a variety of forms with remarkable properties. They offer products that are colorless and odorless, tough, elastic and adhesive, of high optical clarity, and stability to light and heat. One form is soft, elastic and rubber-like, and yields a film which, at ordinary temperatures, can be stretched 1000 per cent before breaking. Another type is hard and tough and can be sawed, carved or worked on a lathe. It is used as a clear sheet for airplane windows and for laminated glass of exceptionally good qualities. Its greatest use thus far, however, is as a water emulsion for under coatings in leather finishes or as a solution in organic solvents for clear lacquers and varnishes.

The foregoing are the principal types of commercial resin plastics. There are numerous others that have been produced experimentally. Current research in the petroleum and paper industries gives promise of new compounds of this character that will sooner or later come into the market. The rapid growth of the plastics industry has created a demand for new chemicals to serve as plasticizers, thinners, and solvents with accurately controllable properties of boiling range, dry point, odor, specific gravity, and fluidity.

RUBBER-LIKE OR RUBBER BASE PLASTICS

Turning now to another type of plastics, we find that research for synthetic rubber and for new derivatives of rubber itself has yielded a remarkable series of products. Thiokol, DuPrene, Koroseal, and AXF are products of the search for synthetic rubber and are rubber-like in their properties. Plioform and Tornesite are examples of rubber derivatives.

Thiokol was the pioneer rubber-like product. It is available as sheet stock, liquid, and powder for molding, and it can be processed and vulcanized like rubber. One of its important properties is that, unlike rubber, it does not swell in contact with gasoline. It is stable to light, and flexible even at —45 F. Thus far it has found a wide variety of industrial uses. It can be molded in intricate shapes, and can be extruded as a sheath for cable. In the printing industry it is used for ink rollers and press blankets, and can be formed into printing plates. In the petroleum industry it is used as hose for gasoline, and for sealing the floating roof of gasoline and oil storage tanks.

Koroseal is a rubber-like plastic with properties that make it adaptable where rubber itself fails to meet the conditions of service. It varies in hardness from soft jellies to hard rubber, and can be molded, extruded or sheeted. The hard varieties can be machined, bored, and threaded. All forms show remarkable resistance to deterioration in light, water, and air, and to the corrosive action of certain chemicals and oils. They are useful for the impregnation or coating of fabrics, paper, and metals, and for the manufacture of tubing for corrosive gases like chlorine.

AXF is the trade name of another rubber-like synthetic organic compound that is used as an auxiliary compounding material with other rubber-like plastics. It promotes flexibility in hard rubber, and increases resistance to ozone cracking.

DuPrene is one of the newest synthetic products having rubber-like properties. Like rubber it can be processed and vulcanized, with or without sulfur. Compared with rubber it offers greater resistance to gasoline, oil, and grease, and is more stable to light and heat. It has found application in pumps, hose, belting, adhesives, and packing. Tires have been built and tested with satisfactory results. Leather, fabrics, asbestos, and cork have been impregnated for special service. In the printing industry it gives good service as rollers and blankets and it is also suitable for insulation for portable electric cable.

Plioform is a rubber derivative made from pale crêpe rubber, and is a true thermoplastic molding material. It resists the attack of water, all alkalies and most acids, and has excellent electrical properties. In its resistance to cold flow it is superior to rubber. The fact that it contains no sulfur makes it useful where ordinary hard rubber is objectionable. Interesting results have been obtained with this plastic in the field of sound production. When used as a sounding board, it approaches violin wood in its ability to produce pleasing tonal qualities, and when used as a recording medium it is able to reproduce clear high-frequency tones clearly. It can be used for the impregnation of fabrics for the production of laminated fabric sheets; and with the addition of fillers, dyes, and pigments it gives moldings with a variety of pearlescent colors suitable for decorative panels and other finishes. Vessels may be molded with walls 0.025 to 1¼ in. in thickness.

Tornesite, a chlorinated rubber derivative, has been developed primarily as a protective coating for metals. It is not merely a new ingredient for paint and lacquer, but an entirely new base that shows remarkable resistance to acids, alkalies, smoke and fumes. For such use it can be brushed or sprayed, and a variety of pigments can be incorporated. The clear compound has good dielectric properties, even in the presence of moisture. It also mixes well with gums and plasticizers.

As a whole these rubber-like compounds and rubber derivatives offer a new line of products of exceptional qualities that have only begun to find their fields of usefulness.

CARBON

Carbon is not often considered as a material of construc-

tion, but in the opinion of some chemical engineers it has been neglected in this respect. Certainly enough progress has recently been made in this direction to warrant a wider knowledge of the material and its industrial uses. Some of the properties that recommend its use are chemical inertness except to oxidation at high temperatures, low coefficient of thermal expansion, low bulk density and absence of softening or melting point. It can be molded or extruded, and can be sawed, planed, drilled, turned, threaded or ground to precise dimensions with ordinary tools. Within practical pressure limits it can be made impervious to liquids and gases. Porous carbon suitable for filtration or diffusion is also being developed.

Carbon has already found a wide variety of industrial uses. Tubes up to 10 in. in diameter are used in Cottrell precipitating plants for the manufacture of phosphoric and sulfuric acids, and for the cleaning of sulfurous smelter gases. In the paper and pulp industry carbon blocks are used for lining pulp digesters and have given superior service without erosion or spalling, and without discoloration of the product. These blocks are laid in silicate of soda cements, or in sulfur carbonaceous cements used at a temperature of 140 C. Impervious carbon tubes previously mentioned are made of carbon or graphite, but preferably the latter because it is more easily machined. This material is impervious to practically all acids and some alkali solutions. Its heat conductivity is very high, so that tubes can be used for heat interchange. Another use is as a refractory for furnace lining. Industrial equipment made of carbon includes pump impellers, bearings, bushings and gaskets for severe service. Manufactured carbon lumber, for structures where corrosive conditions are unusually bad, has been produced in forms suitable for walls, beams, and roofing. New applications will doubtless be made when the valuable properties of fabricated forms of carbon are more widely appreciated.

DETERGENTS

I have noted that the Society is forming a new standing committee on soap and detergents and that the development of specifications will be under way soon. Detergents find a wide use in the production of textiles and in the laundry business. Although the new so-called soapless detergents are not soaps in the customary sense of the term, they act in a similar manner, lathering freely in hard water and having unusual penetrating action. Chemically they are double sulfates of sodium and alcohols of the ordinary fatty acids—palmitic, stearic and oleic. But since they contain no fatty acids they have the great advantage of not forming insoluble scums with the lime and magnesia in the water.

METALS AND ALLOYS

The Society has properly given metals and alloys a vast amount of attention. They are of ever-present interest to chemical engineers, particularly in view of the trend toward higher temperatures and pressures in industrial processes. This means a constant search for materials that will withstand increasingly severe service in the full realization that there is no panacea for corrosion and that the best cure is the right metal in the right place.

Research is continually bringing out new alloys that will call for standard tests and specifications. In a recent review of metals and alloys used in the construction of chemical plant[3] the author notes a number of new developments.

A 2 per cent chromium, low-silicon steel has just been announced, but experience is limited to a few test pieces and therefore much has still to be learned about its practical uses. It was developed to meet the need for an economical steel for applications requiring reasonable resistance both to corrosion and to oxidation.

The addition of nitrogen to chromium and chromium-nickel steels is attracting attention. The nitrogen, which is believed to be in combination with chromium as nitride, inhibits grain growth and improves the strength and ductility of the material. With high-chromium alloy castings, a product is obtained that withstands abuse without cracking, suggesting among others its use in pump impeller parts having great differences in cross section. The introduction of nitrogen to chromium-nickel steels improves machinability and provides non-magnetic castings of relatively high strength. Little difficulty is met in welding steels containing nitrogen, and last, but not of least importance, is the fact that these improvements in mechanical properties are not obtained by the sacrifice of corrosion resistance.

Lead has long been a favorite in the process industries. Until very recently there were only two important types of lead used in the chemical industry in the United States—chemical lead and hard lead. Tellurium lead, which contains only a very small amount of the alloying material, is a new development that was brought over from England two or three years ago. Tellurium lead has greater tensile strength and more resistance to fatigue and corrosion than other chemical leads. Rather brief experience with it in America indicates that for a short period this lead alloy will withstand boiling sulfuric acid and that it satisfactorily resists phosphoric acid, chlorine gas, impure solutions of sodium sulfite, and sulfur dioxide.

This alloy of lead has the unusual characteristic of toughening when strained. The tensile strength and resistance to fracture can be improved by working; and although work-hardened tellurium lead is harder than chemical lead, it is not brittle. A sheet can be bent and hammered at a bend without fracture. The importance of a metal which strengthens under strain is obvious, especially when utilized in equipment such as agitator tanks where vibration stresses are encountered. At high temperatures there should be less tendency to sag, buckle, and crawl, with less possibility of fracture after prolonged service.

Silver has been used to a limited extent for chemical equipment for many years; but the recent changes which have taken place in the economic position of the metal, particularly their influence on its price, have broadened its use in the industry. Silver has a very high thermal conductivity and therefore the mass of metal is subject to rapid changes in temperature. It can be easily fabricated by spinning, drawing, or other operations, soldered either with soft solder or silver solder, and joined by autogeneous gas welding.

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[3]Metals and Alloys Used in the Construction of Chemical Plant. By James A. Lee, Managing Editor, *Chemical & Metallurgical Engineering*. A paper prepared for the Am. Inst. of Chem. Engrs., and presented at the Chemical Engineering Congress, London, June, 1936.

Determining the Percentage of Moisture in Soil Samples without Drying

By Edward E. Bauer[1]

THIS paper is a report of efforts made by the author at the University of Illinois to adapt the procedure developed by Mr. W. M. Dunagan at Iowa State College[2] for the determination of the constituents of freshly made concrete, to the determination of the moisture content of soils. The paper explains briefly the theory involved, describes the equipment and test procedure used, and gives the results of tests, including results of check tests of oven dried samples.

There are times when engineers want to know the moisture content of a soil and do not have the time to wait for the drying of the soil sample. Since the apparatus described in this paper can be transported easily, it can be used in the field for determinations where the use of a drying oven is not feasible. Theoretically, the procedure should give values of moisture content agreeing exactly with those of oven drying, but the errors of manipulation are not always compensating and as a result the values usually differ a small amount from the values secured by oven drying.

THEORY

Specific gravity is defined as the ratio of the weight of a material to the weight of an equivalent volume of water. It is a regular method of procedure to determine specific gravity by weighing a sample in air and then weighing the same sample suspended in water—the loss of weight when suspended in water is equal to the weight of water displaced by the sample. Variations in temperature change the densities of water and soil, and if the range of temperature is not comparatively small, corrections should be made for the temperature effects.

From the previous definition:

$$g = \frac{W_o}{W_o - W_i}$$

where g = average specific gravity of the soil grains,
W_o = weight of sample of soil oven dried, and
W_i = weight of sample of soil when suspended in water.

From this equation we derive:

$$W_o = \frac{g}{g-1} W_i$$

in which g must be known from a previous test and W_i is determined by test. The moisture in the sample of course does not affect the weight in water. In order to compute the percentage of moisture it is necessary to determine the weight W_m, weight of sample of soil including the moisture, before weighing the sample suspended in water.

If we let P = percentage of moisture in the sample, based on the dry weight of the soil, then

$$P = \frac{W_m - W_o}{W_o} 100$$

Substituting the value of W_o from above, we have

$$P = \left[\frac{W_m}{W_i} \frac{g-1}{g} - 1 \right] 100$$

in which $\frac{g-1}{g}$ is constant for any soil, and W_m and W_i are values which must be established for each moisture content determination. If the temperature varies from that chosen as the standard for the series of tests, the correction for this temperature change may be made by substituting in the expression $\frac{g-1}{g}$ the exact value of the density of water at the temperature at which the test is made, instead of using the value *one*.

EQUIPMENT

Because many of the soil particles are extremely fine and will remain suspended in water for long periods of time, the open bucket used in Mr. Dunagan's method for concrete determinations can not be used for a soil. If the open bucket containing the soil is immersed, the flow of water into the bucket would cause considerable turbulence and an unknown quantity of soil would be dispersed in the suspending liquid, increasing its density and decreasing the total weight of soil in the container.

To eliminate such turbulence a Hubbard-Carmick glass specific gravity bottle (pycnometer) was used, which must be completely filled with soil and water. The center hole in the stopper was drilled to a diameter of 1/8 in. and near this a second hole was drilled. The latter permits water to be added to the bottle and the air to escape, whereas in the regular use of the bottle some of the water is extruded as the stopper is inserted. Since some of the soil will be in suspension, it is undesirable to lose any of the water.

The apparatus used in the determination is shown in Fig. 1. The balance is of the triple-beam type, reading to 0.01 g., with a capacity of 100 g. The specific gravity bottle is suspended from the weighing hook of the balance by means of a wire wrapped around the bottle. The container, which is held at a constant height, has an overflow so that a constant depth of water may be maintained. A beaker is used to catch the overflow water.

PROCEDURE

The first operation is to determine the weight of the bottle suspended in air, and then suspended in water. In ascertaining the weight in water, the bottle is first completely filled with water with the stopper in place, care being taken that no air is entrapped.

The sample of moist soil, 10 to 15 g., is placed in the bottle and weighed in air. Loss of moisture should be kept at a minimum. Water is then added to the sample until the bottle is about two-thirds full. Some air will be trapped in the soil, but much of this can be removed by stirring with a

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[2] W. M. Dunagan, "A Study of the Analysis of Fresh Concrete," *Proceedings*, Am. Soc. Testing Mats., Vol. 31, Part I, p. 362 (1931).

glass rod. Boiling and suction are more effective methods, but boiling adds considerably to the time necessary to perform the test, since the bottle and its contents must be cooled before weighing suspended.

After the air is removed, water is added until the bottle is nearly full, the stopper is inserted and the bottle filled completely with water using a medicine dropper. The weight suspended in water is then taken and the percentage of moisture calculated.

TEST RESULTS USING APPARATUS

A large number of tests have been made to determine the practical usefulness of the procedure. Typical results are given in Table I, in which three soils are represented with a total of 40 determinations. Each soil in the air-dried condition was mixed with water until the water appeared to be uniformly distributed. Four small samples were immediately taken, two for the determination using the specific gravity bottle (pycnometer) and two for the oven-drying check test. The test was repeated a number of times for each soil *but no attempt was made to have an equal moisture content for all samples of the same soil.*

ACCURACY

A study of the effects of variations of various factors indicates the following:

1. An error of 1 per cent in the average value of the specific gravity of the soil particles will introduce an error of approximately 0.4 per cent in the percentage of moisture.

2. An error of 1 per cent in W_i will cause an error of approximately 0.6 per cent in the moisture determination.

3. If the determined value of W_m is 0.05 g. greater than the correct figure and W_i 0.05 g. less (when W_i is about 10 g.) the error in percentage moisture is about 0.9 per cent.

4. The presence of air in the bottle when the weight W_i is determined will give a value of W_i that is too small, which in turn will give too large a value for the moisture determination.

5. The assumption that the density of water is 1, whereas it is less than 1 for all temperatures other than 4 C., gives values which are slightly low.

6. After making a large number of moisture determinations in this series and in connection with other tests, it appears that it is extremely difficult to secure two samples from a mass of soil that will show exactly the same moisture content on oven drying. There is always some loss due to evaporation, too, which makes it difficult to secure a close check between the method proposed and oven drying.

7. While the drying period in the oven was usually 24 hours, no particular effort was made to remove the samples at the end of that time. A study was made to determine the effect of the extra drying period on the percentage of moisture. The conclusion may be drawn that for all practical purposes the sample is dried to a constant weight at 24 hours, and that further periods in the oven will change the value

(Concluded on page 13)

TABLE I—RESULTS OF MOISTURE DETERMINATIONS AND CHECK TEST RESULTS WITH OVEN DRYING

(The various samples for each soil contained different amounts of moisture at the beginning of the determinations.)

Sample	Percentages of Moisture Based on Oven Dry Weights					
	Soil A		Soil B		Soil C	
	Pycnometer	Oven	Pycnometer	Oven	Pycnometer	Oven
1	20.45	18.95	12.09	12.35	22.71	22.60
	19.21	18.90	11.39	12.05	22.25	22.00
Ave.	19.83	18.92	11.74	12.20	22.48	22.30
2	19.23	17.65	5.61	6.02	16.54	15.68
	19.02	17.63	5.86	5.83	16.58	15.40
Ave.	19.12	17.64	5.74	5.92	16.56	15.54
3	15.36	13.08	3.23	2.90	18.06	18.01
	15.32	13.71	3.26	2.91	19.88	18.03
Ave.	15.34	13.40	3.24	2.90	18.97	18.02
4	18.19	16.38	4.78*	5.54	16.55	15.41
	17.54	16.30	4.74*	5.58	16.35	15.50
Ave.	17.86	16.34	4.76*	5.56	16.45	15.46
5	20.77	18.12	6.02*	6.63	16.58*	16.20
	18.10	18.15	5.62*	6.75	15.72*	15.72
Ave.	19.44	18.14	5.82*	6.69	16.15*	15.96
6	20.50*	18.90	10.85*	10.33	18.20*	20.25
	18.28*	18.40	11.04*	10.40	19.65*	20.30
Ave.	19.39*	18.65	10.94*	10.36	18.92*	20.28
7	23.78*	20.85	.....	.....	13.10*	13.69
	20.80*	21.10	.....	.....	13.64*	13.84
Ave.	22.29*	20.98	.....	.....	13.37*	13.76

* Sample boiled to remove the entrapped air.

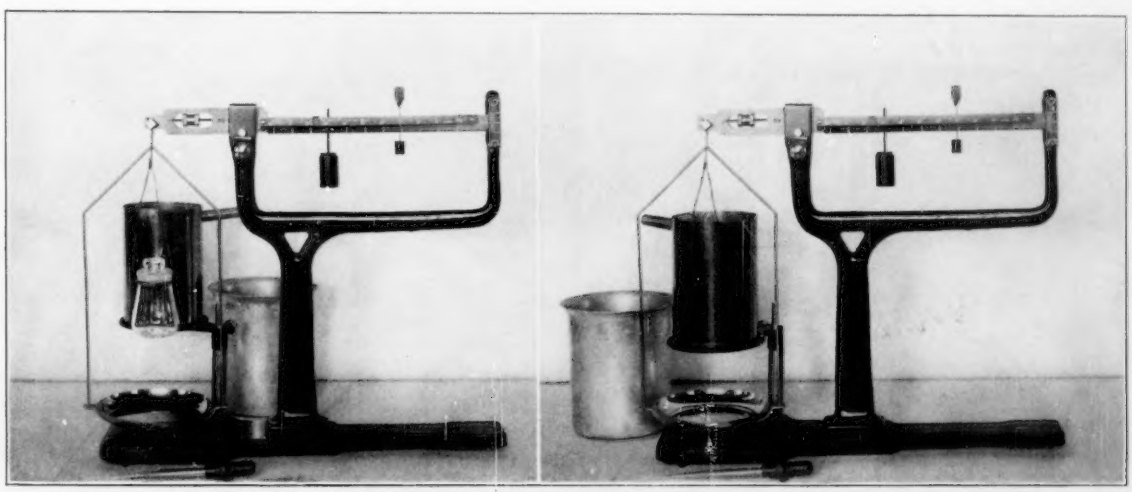

Fig. 1. ***Left,*** **apparatus ready for a weight-in-air determination, and** ***right,*** **assembled for a suspended-in-water determination.**

Representing the Distribution of Ground Stresses

• By Ing. K. Fischer, Vienna, Austria

EDITOR'S NOTE.—The Austrian Society for Testing Materials, Mr. O. Hönigsberg, Secretary, Michelbeuerngasse 6 (Techn. Versuchsamt), Vienna, Austria, is kept currently informed of A.S.T.M. activities through an exchange of publications. The Austrian Society has submitted a number of comments on our work, these having been transmitted to the interested A.S.T.M. committees. The following short, but interesting paper, was included in the material received from Mr. Hönigsberg.

THE distribution of stress in homogeneous soils is one of the foremost problems of foundation work. In view of this a series of theoretical studies and practical experiments on the subject have been made in various countries and even though reliable formulas for the computation of stress distribution and deformation have been developed, many questions still remain unanswered. It need hardly be pointed out that every mathematical formula must be proved experimentally in order that its validity can be established. Unfortunately, in the case of representing ground deformation, the experimental apparatus and procedure are both cumbersome and expensive, a fact which may make a suggestion in this field all the more welcome.

It has been standard practice, up to the present time, to carry out such experiments with layers of sand colored in stripes, which necessitated rather troublesome preliminary work in preparation and placement. After numerous experiments, the author has developed a method that enables representation of the distribution of stress in homogeneous masses of sand in a very simple manner and so that this improvement may be brought to the attention of those interested, it is briefly described.

The apparatus consists of the customary box-like container with wooden walls, the front one being a strong glass plate slid in along grooves from the top (Fig. 1). The placing of the sand in colored layers however, is avoided. Before the glass plate is put in place a number of parallel lines consisting of a special coloring matter (aniline violet) are thickly ruled on it. After all lines have been dried, the glass plate is for a short time put into a damp space or treated with aqueous vapor in order that the colored lines will be moistened to the same degree. The glass plate is then slipped into the empty container with the lines on the inside face of the plate. By means of a funnel, fine sand is now carefully poured into the container, the filling progressing steadily in horizontal layers until the desired height is reached with a level, even surface. The grains of sand against the glass plate will absorb color from the lines. The test load must now be applied immediately in such a way that the plunger will be against the inner surface of the glass plate in order that the observations can be made in the vertical plane of the plate. The application of the load will show distinctly

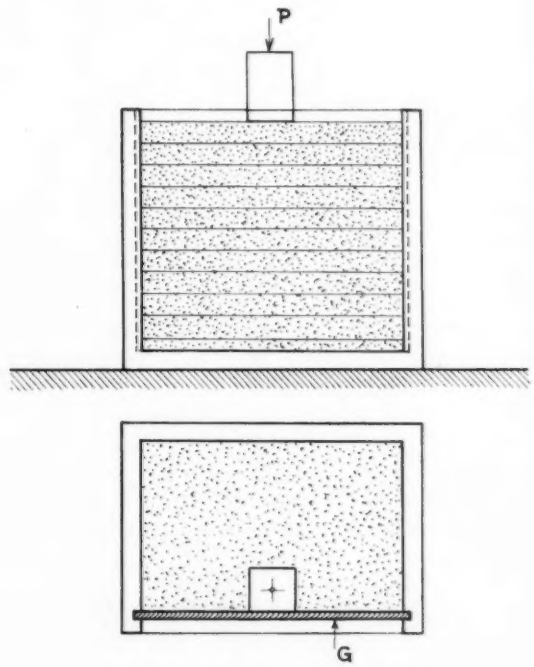

Fig. 1.—Diagram of Apparatus

the progressive deformation of the sand layers, thus also affording a view of the stress distribution.

Some examples of the author's experiments are shown in

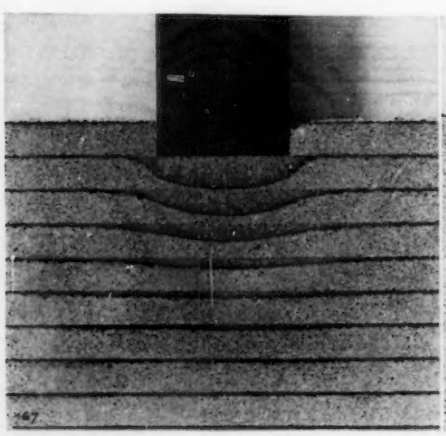

Fig. 2.—Horizontal Plane, Square Plunger, Vertical Load

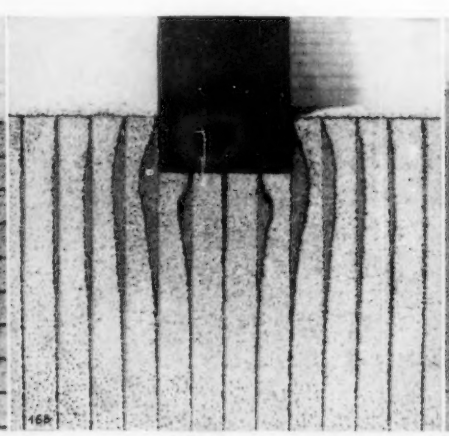

Fig. 3.—Vertical Plane, Square Plunger, Vertical Load

Fig. 4.—Deformation of Circles Through Edges of a Plunger

the accompanying photographs. Figure 2 shows the distribution of stress in horizontal layers under a square plunger with vertical load, while Fig. 3 gives the same load with a representation of deformations in vertical planes. It is difficult to demonstrate the latter deformations in any other way. Figure 4 shows the deformation of circles passing through the edges of the plunger. In this connection, it was possible to prove that such circles represent the location of like deformations (isochromes), a fact already theoretically known.

Deformations in more complicated procedures can be represented in this way also, such as the deformation of horizontal layers when a pile is driven (Fig. 5) and, finally, the deflection of horizontal lines in the case of the overturning of a vertical wall (Fig. 6).

It is hoped that this brief description of the new methods will arouse the interest of those concerned with the study and research in the field of soils and foundations and that more experiments along this line will be carried out.

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Silver equipment is generally made entirely of metal 999 fine. Silver-lined equipment is used when a vacuum or high pressure is employed, especially if the equipment is large and is operated at a high temperature. Three types of linings are available: (1) linings which are fitted in without being permanently attached to the outer wall; (2) electro-plated linings, and (3) clad-metal walls. Whereas the bimetallic construction has been limited to a few small installations, much interest has been shown in the possibility of using it for the fabrication of large pieces of equipment and further development work is in progress.

In conclusion it should be made clear that this presentation is merely an outline of some of the new products that are coming out of the research laboratory. I have purposely omitted details of their chemical composition and manufacture, and have emphasized their chemical and physical properties and their uses. That they are likely to increase in number and almost certain to find more extensive use as materials of construction is enough to commend them to your consideration.

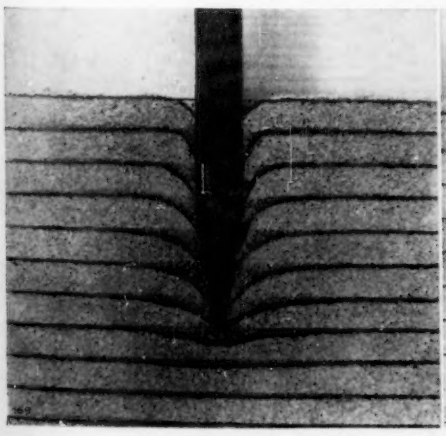

Fig. 5.—Horizontal Layers Deformed by a Pile

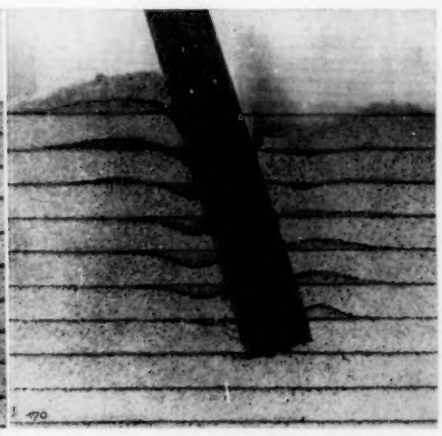

Fig. 6.—Horizontal Layers Deformed by Overturning Wall.

Moisture in Soil Samples

(Concluded from page 11)

but slightly. A summary of these results is given in Table II.

TABLE II—EFFECT OF CONTINUED PERIODS OF DRYING ON THE PERCENTAGE OF MOISTURE VALUE

Soil	Percentage Moisture, Based on Oven Dried Weight					
	Drying Period at 110 C.					
	22 hr.	45 hr.	68 hr.	114 hr.	141 hr.	384 hr.
1	0.5273	0.5300	0.5306	0.5328	0.5328	0.5939
2	3.547	3.547	3.729	3.794	3.799	3.799
3	0.7313	0.7326	0.7326	0.7561	0.7561	0.8009
4	7.794	8.040	8.091	8.150	8.340	8.419
5	1.258	1.286	1.300	1.305	1.305	1.345
6	0.3236	0.3276	0.3455	0.3711	0.3711	0.3905
7	1.178	1.205	1.248	1.248	1.248	1.290
8	7.783	7.815	7.837	7.856	7.860	7.873
9	20.619	20.674	20.710	20.722	20.734	20.734
10	17.359	17.384	17.384	17.402	17.402	17.402

1937 Meetings in Chicago and New York

AFTER detailed consideration of the places proposed for the 1937 Regional Meeting and the Society's Fortieth Annual Meeting, the Executive Committee has selected Chicago for the former and the 1937 annual meeting is to be held in New York City.

Next year's regional meeting will be held on the Wednesday of A.S.T.M. Committee Week, which begins Monday, March 1, extending through Friday, March 5. The technical feature, A Symposium on Motor Lubricants, will be developed by Committee D-2 on Petroleum Products and Lubricants. The regional meeting sessions and meetings of the committees will be held at the Palmer House. Local arrangements will be in charge of the Chicago District Committee, headed by W. A. Straw, Western Electric Co. The regional meetings had not been inaugurated when in 1929 the group committee meetings took place in Chicago, so that this will be the first held there.

The Fortieth Annual Meeting will be at The Waldorf-Astoria, from June 28 to July 2, inclusive, and the Society's Fourth Exhibit of Testing Apparatus and Related Equipment will be sponsored in conjunction with the meeting. Excellent facilities for the A.S.T.M. type of meetings and exhibit are available and the entire lobby space, main function rooms and restaurants are air conditioned. Special hotel rates will be accorded those registering at the A.S.T.M. meeting.

A number of interesting subjects have been suggested for the technical sessions, all of which will be studied by the Committee on Papers and Publications. The New York District Committee under the chairmanship of Dr. M. F. Skinker, Brooklyn Edison Co., will take a very active part in developing plans for the meeting and a number of special subcommittees will be appointed.

A. S. T. M. BULLETIN

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Continuity

THE word "continuity" when used in connection with a motion picture scenario is the arrangement of the incidents in dramatic sequence, but its use here is as an "uninterrupted succession" or "unbroken connection." A.S.T.M. standardization work and the committee work on which it is based may not be dramatic, but the results of the intensive efforts of the committees are certainly marked by their continuity.

One who followed closely the great activity in standardization at the recent meeting might well wonder if many of the committees would not soon exhaust their programs at the present rate of output. A detailed study of the committee reports, or a brief review of the article on standardization activities in this issue will convince one that while much has been done, there is a great deal more to do.

Take for example the oldest committee—on steel. It made a great many recommendations on standards including eight new tentative specifications. And it is now completing four more new ones to come before the Society in the next two months! Many other committees are doing likewise. No depression here. Continuity—and plenty of it!

It is frequently said that there is no harder working body of men than those participating in A.S.T.M. committee work. It does take intensive and continuous work to develop over 800 specifications and test methods, to keep them up to date, and to formulate requirements for new products. Standardization must always go forward and not impede future progress.

The continuity of A.S.T.M. standards development is the responsibility of the standing committees. Ample evidence is at hand to prove conclusively that this work is advancing—rapidly—and this continuity is, at the same time, a tribute to the committee work and the committee members and their officers, many of whom have *worked* in A.S.T.M. for many years. The new committee officers and incoming committee members have a rich heritage . . . of *work*, but A.S.T.M. —and each member is a part of A.S.T.M.—thrives on it.

Business Activity Means Larger Opportunities for the A.S.T.M.

THE 39th Annual Meeting was one of the most successful in the history of our Society. The registration of 1131 members and guests broke all records of meetings held at Atlantic City; the papers were of unusual interest as evidenced by the attendance at the various sessions and the pertinent discussion which followed the presentation of the papers. Outstanding in this respect were the sessions on water, rubber and on radiography and x-ray diffraction methods.

The participation of other technical groups outside our own Society brought many guests to our meeting who thus became acquainted with the work of the A.S.T.M. Many of them are no doubt very much interested in the work the Society is doing. Each member is urged to contact his guest friends and bring to their attention the value of Society membership in this period of expanding industrial activity, during which many new engineering materials will be introduced to commercial use.

Research discoveries of the depression are now being developed in many directions. As Doctor Parmelee pointed out in his informative address on "Relationship of A.S.T.M. to Modern Developments in Chemical Engineering," the chemist is providing us with a host of new synthetic materials with new properties. The determination and evaluation of these properties, the development of standard methods of test and the formulation of specifications for these new materials is the duty and privilege of the A.S.T.M. Our Society should assume the same position of leadership with respect to the rapidly growing plastics industry that it has in iron and steel.

Recently, new committees have been organized or authorized on Gaseous Fuels, Soaps and Detergents, Paper and Soils for Engineering Purposes. These committees will extend the usefulness of the A.S.T.M. and will bring new members into the organization.

A committee on Low Temperature Insulating Materials has been suggested, in view of the rapid growth of air conditioning. Have you any suggestions for meeting the needs of new industrial development? If so, write to the Secretary-Treasurer and he will be glad to present the suggestions to the Executive Committee for consideration.

With your help, the Executive Committee will meet the larger opportunities which increasing business activity has placed before us.

President 1936-1937.

1936 Year Book Sent on Request

ALL members of the Society who wish to obtain a copy of the 1936 Year Book (now in preparation) should return promptly the enclosed request card. Copies will be sent only on request.

As customary, the 1936 edition will contain the complete membership list. The committee section, listing the full personnel and officers of all A.S.T.M. standing committees will be included, as well as the By-laws, Regulations Governing Standing Committees, Society representatives, etc.

Membership Statistics Encouraging

THE annual report of the Executive Committee enumerates encouraging results from the efforts to increase the membership. Compared with the "drab" figures of 1933 and 1934, the statistics for the year ending June 1, 1936, were of a much more "rosy hue." The net gain in membership for the year was 129, compared with 43 a year ago, and net losses of 164 and 430 for the years ending June 1, 1934 and 1933 respectively. Losses totaled 205, considerably less than in the two previous years.

During the year, there were 334 elections to membership, which compares with 319 and 254 for the two previous years. For the first six months of 1936 there were 281 new members elected, a gain of 30 over the corresponding period in 1935.

From these statistics members will realize that the membership curve which began an upward trend last year has continued and turned up more sharply. This, as indicated in the report, is due in no small measure to the activities of the members in helping to regain the ground lost.

Realization that the present membership total, about 3775, is below the peak reached in 1930 by 650 in round figures, calls for the statement of fact that this work to obtain new members must go forward unabated. With the current research and standardization work, all of which is of great value to industry, continuing intensively, much new work getting under way, and the Book of Standards in course of publication, 1936 is a most appropriate year for those who would find A.S.T.M. affiliation of benefit, to become members.

It is a fact that membership promotion work must continue with all possible vigor. Every member can be of service by being new-member conscious, by sending the names of prospective members to A.S.T.M. Headquarters where facilities have been set up for extending invitations, and by helping to follow up these invitations. These efforts will redound to the good of the whole Society.

Discussion of Meeting Papers

WRITTEN discussion of the papers and reports presented at the 1936 annual meeting will be received by the Committee on Papers and Publications until September 1. All who plan to submit discussion are urged to send it to Society Headquarters as far in advance of the closing date as possible in order to facilitate the preparation of the material for the *Proceedings*.

Publication on High-Strength Metals

THE five papers and discussion comprising the Symposium on High-Strength Constructional Metals to which the two sessions of the A.S.T.M. Regional Meeting in Pittsburgh in March were devoted will shortly be available in the form of a special publication. Giving extensive information and data, the various papers covering alloys of copper, nickel, aluminum and magnesium, carbon and low-alloy steels and corrosion-resisting steels, were considered of outstanding interest. A special order blank is enclosed with this BULLETIN. The papers are now being set in type and it is anticipated that copies of the published symposium will be available for distribution late in August or early September.

Large Number of Actions Referred to Letter Ballot

BY ACTION of the annual meeting, 143 recommendations from the standing committees affecting standards and tentative standards were approved for submission to letter ballot of the Society membership. These recommendations comprise 76 tentative standards proposed for adoption as standards and the adoption as standard of revisions proposed in 67 existing standards. A complete list of the items to be voted upon appears in the letter ballot enclosed with this BULLETIN. Detailed information concerning all matters referred to letter ballot is given in the committee reports issued in preprint form to the membership in advance of the meeting. The accompanying Summary of *Proceedings* contains a record of all actions taken at the annual meeting and also gives in full detail any changes in or additions to the standing committee recommendations as preprinted.

All members in good standing are urged to execute the enclosed ballot and vote on the matters on which they feel technically qualified to pass judgment.

Wrought-Iron and Wrought-Steel Pipe Standard Published

CULMINATING eight years of work by the Sectional Committee on Standardization of Dimensions and Material of Wrought Iron and Wrought Steel Pipe and Tubing which functions under the procedure of the American Standards Assn., with the A.S.T.M. and A.S.M.E. as joint sponsors, there has been approved and published an American Tentative Standard for Wrought-Iron and Wrought-Steel Pipe. This has been approved by the two sponsor bodies and by the A.S.A. In its report presented at the A.S.T.M. meeting, the committee points out that with the completion of this standard, the purpose for which the committee was organized, namely, "To coordinate and standardize with a view to reducing unnecessary duplication, the design, dimensions, and material requirements of pipe" has been fulfilled.

The committee, which is headed by H. H. Morgan, Robert W. Hunt Co., with Sabin Crocker, Detroit Edison Co., as secretary, in its consideration of a proposed standard has held numerous meetings and a large number of drafts of the proposals have been prepared. The published standard includes certain well defined series or schedules of pipe wall thickness covering a wide range of pressure-stress ratios, these dimensions having been selected from existing lists of overlapping sizes and thicknesses. For material requirements, the tentative standard contains parts of and refers specifically to, ten A.S.T.M. and one A.P.I. pipe specification, and recommends that material be ordered and made in accordance with these specifications or subsequent revisions of them.

Copies of this important new American Tentative Standard, to which the A.S.A. has assigned the designation B 36.10 - 1935, can be obtained at 50 cents per copy from A.S.T.M. Headquarters, or from the Headquarters of the A.S.M.E. or A.S.A.

New and Revised Tentative Standards

Standardization List Greatly Augmented

THE Society accepted at the annual meeting 32 new tentative standards and revisions of 41 existing tentative specifications and methods of test. Of the new tentative standards, 26 represent additions to the standardization list, 6 are revisions of existing standards. Seven of the 41 revised tentative specifications and test methods represent extensive modifications. The titles of these are included below with the list of those issued by the Society for the first time. Standing committees responsible for the various items are indicated in italics.

FERROUS METALS

Specifications for:

Structural Nickel Steel (A 8 – 36 T) (revision of standard). *Committee A-1 on Steel.*

Fabricated Steel Bar or Rod Mats for Concrete Reinforcement (A 184 – 36 T). *Committee A-1.*

Welded Steel Wire Fabric for Concrete Reinforcement (A 185 – 36 T). *Committee A-1.*

Carbon-Steel Castings for Miscellaneous Industrial Uses (A 27 – 36 T) (revision of specifications A 180 – 35 T and to replace A 27 – 24). *Committee A-1.*

High-Carbon-Steel Joint Bars (A 5 – 36 T) (revision of standard). *Committee A-1.*

Quenched Carbon-Steel Joint Bars (A 49 – 36 T) (revision of standard). *Committee A-1.*

One-Wear and Two-Wear Wrought-Steel Wheels (A 186 – 36 T). *Committee A-1.*

Seamless Cold-Drawn Alloy-Steel (4 to 6 per cent Chromium) Heat-Exchanger and Condenser Tubes (A 187 – 36 T). *Committee A-1.*

Seamless Alloy-Steel (4 to 6 per cent Chromium) Still Tubes for Refinery Service (A 188 – 36 T). *Committee A-1.*

Single and Double Refined Wrought-Iron Bars (A 189 – 36 T). *Committee A-2 on Wrought Iron.*

Lightweight Thin-Sectioned Gray-Iron Castings (A 190 – 36 T). *Committee A-3 on Cast Iron.*

Method of:

Test for Uniformity of Coating by the Preece Test (Copper Sulfate Dip) on Zinc-Coated (Galvanized) Iron or Steel Wire (A 191 – 36 T). *Committee A-5 on Corrosion of Iron and Steel.*

NON-FERROUS METALS

Specifications for:

Hard-Drawn Copper Alloy Wires for Electrical Conductors (B 105 – 36 T). *Committee B-1 on Copper and Copper Alloy Wires for Electrical Conductors.*

Bronze Castings for Turntables and Movable Bridges (B 22 – 36 T) (revision of standard). *Committee B-5 on Copper and Copper Alloys, Cast and Wrought.*

Bronze Castings in the Rough for Locomotive Wearing Parts (B 66 – 36 T) (revision of standard). *Committee B-5.*

Car and Tender Journal Bearings, Lined (B 67 – 36 T) (revision of standard). *Committee B-5.*

Sheet and Strip Phosphor Bronze (B 103 – 36 T). *Committee B-5.*

Seamless Copper-Nickel Alloy Condenser Tubes and Ferrule Stock (B 104 – 36 T). *Committee B-5.*

Magnesium-Base Alloy Bars, Rods and Shapes (B 107 – 36 T). *Committee B-7 on Light Metals and Alloys, Cast and Wrought.*

Method of:

Test for Deflectivity of Thermoflex (Thermostatic Metals) (B 106 – 36 T). *Committee B-4 on Electrical-Heating, Electrical-Resistance and Electric-Furnace Alloys.*

REFRACTORIES

Method of:

Panel Test for Resistance to Thermal and Structural Spalling of Super Duty Fireclay Brick (C 122 – 36 T). *Committe C-8 on Refractories.*

Definitions of:

Terms Relating to Refractories (C 71 – 36 T). *Committee C-8.*

SAND FOR LIME AND GYPSUM PLASTER

Specifications for:

Sand for Use in Plaster (C 35 – 36 T) (revision of Standard Specifications C 35—30 and Tentative Specifications C 66 – 31 T). *Committees C-7 on Lime and C-11 on Gypsum.*

CONCRETE

Methods of:

Laboratory Method of Making Flexure Tests of Concrete Using a Simple Beam with Third Point Loading (C 78 – 36 T). *Committee C-9 on Concrete and Concrete Aggregates.*

Test for Coal and Lignite in Sand (C 123 – 36 T). *Committee C-9.*

Test for Flow of Portland-Cement Concrete by Use of the Flow Table (C 124 – 36 T). *Committee C-9.*

Definitions of:

Terms Relating to Concrete and Concrete Aggregates (C 125 – 36 T). *Committee C-9.*

COAL

Method of:

Designating the Size of Coal from its Screen Analysis (D 431 – 36 T). *Sectional Committee on Classification of Coals.*

TIMBER AND TIMBER PRESERVATIVES

Specifications for:

Structural Wood Joist and Planks, Beams and Stringers, and Posts and Timbers (D 245 – 36 T) (revision of standard). *Committee D-7 on Timber.*

Zinc Chloride (D 432 – 36 T). *Committee D-7.*

ELECTRICAL INSULATING MATERIALS

Methods of:

Test for Saponification Number of Electrical Insulating Oils (Modified Baader Method) (D 438 – 36 T). *Committee D-9 on Electrical Insulating Materials.*

Testing Electrical Insulating Materials for Power Factor and Dielectric Constant (D 150 – 36 T). *Committee D-9.*

Test for Determining the Electrical Insulating Qualities of Slate (D 273 – 36 T). *Committee D-9.*

RUBBER PRODUCTS

Method of:

Test for Compression Set of Vulcanized Rubber (D 395 – 36 T). *Committee D-11 on Rubber Products.*

TEXTILE MATERIALS

Methods of:

Testing and Tolerances for Certain Carded Cotton Gray Goods (D 433 – 36 T). *Committee D-13 on Textile Materials.*

Test for Resistance to Yarn Slippage in Silk, Rayon, and Silk-Rayon Woven Broad Goods (D 434 – 36 T). *Committee D-13.*

Test for Fastness of Dyed or Printed Cotton Fabrics to Laundering or Domestic Washing (D 435 – 36 T). *Committee D-13.*

Test for Fastness of Dyed or Printed Silk or Rayon Fabrics to Laundering or Domestic Washing (D 436 – 36 T). *Committee D-13.*

Test for Small Amounts of Copper and Manganese in Textiles (D 377 – 36 T). *Committee D-13.*

Testing Congress in London in 1937

ARRANGEMENTS are now being made for the next International Congress of the International Association for Testing Materials, which is to be held in London, England, April 19 to 24, 1937. A large number of technical papers are to be presented at the Congress, and a number of leading American technologists are being asked to cooperate.

The Congress will be sponsored by the British Committee which is headed by Dr. H. J. Gough of the National Physical Laboratory (Doctor Gough, an A.S.T.M. member since 1926, was the 1933 A.S.T.M. Edgar Marburg Lecturer) and this group will be responsible for the Congress book that is to be issued, containing summaries of the large number of items on the program.

W. H. Fulweiler, Vice-President of the I.A.T.M. and American representative on its Permanent Committee, is in charge of American participation in the Congress. Correspondence on this subject should be addressed to him, at A.S.T.M. Headquarters. Further details of the Congress will be announced in the near future.

Organization of New Committee on Soap

Standardization Work To Cover Soap, Detergents and Constituent Materials

ANNOUNCEMENT was made in the April BULLETIN of the authorization to organize a new standing committee on soap and detergents to undertake standardization and research work in this field. An organizing committee developed plans for the work of the committee and the new committee was formally organized at a meeting held during the A.S.T.M. annual meeting in Atlantic City, with H. P. Trevithick, Chief Chemist, New York Produce Exchange, who had been designated temporary chairman, presiding. It was announced that the title of the new committee was to be "Committee D-12 on Soap and Detergents" and after discussion of the statement of the scope of the committee's work, the following was approved:

Scope.—Soaps and detergents, including the materials entering into their manufacture.

The organizing committee developed a committee personnel and a number of additional members were approved at the organization meeting. The present committee consists of the following:

American Association of Textile Chemists and Colorists, Samuel Meeker
American Oil Chemists' Society, M. L. Sheely
American Public Health Assn., C. R. Fellers
Bigelow-Sanford Carpet Co., Inc., G. E. Hopkins
H. E. Cutts, Stillwell & Gladding, Inc.
Ephraim Freedman, R. H. Macy & Co., Inc.
L. B. Hitchcock, Hooker Electrochemical Co.
A. M. Johnsen, Pullman Co.
G. H. Johnson, American Institute of Laundering
Frederick Kenney, Kenney-Herstein, Inc.
Larkin Co., Inc., L. F. Hoyt
Lever Brothers Co., J. E. Doherty
Pauline B. Mack, Pennsylvania State College
C. A. Marlies, College of the City of New York
National Association of Purchasing Agents, W. G. Morse
National Association Institute of Dyeing and Cleaning, Inc., G. G. Gaubatz, Jr.
R. C. Newton, Swift & Co.
The Proctor & Gamble Co., J. B. Crowe
W. M. Scott, Gustavus J. Esselen, Inc.
Sears, Roebuck and Co., J. H. Gregory
F. W. Smither, National Bureau of Standards
Henry Souther Engineering Co., I. L. Newell
Southern Cotton Oil Co., W. D. Hutchins
Southern Pacific Co., Dennistoun Wood
H. P. Trevithick, New York Produce Exchange
U. S. Navy, Naval Clothing Depot, Frederick Krassner
United States Testing Co., Inc., W. H. Tiffany
B. S. Van Zile, Colgate-Palmolive-Peet Co.

Consulting Members:

H. C. Bennett, Los Angeles Soap Co.
E. R. Luckow, Allen B. Wrisley Co.

It will be noted from the above list that the committee consists of representatives of consumers of soap and detergents, producers and a general interest group. This policy of having adequate representation from these three groups is, of course, fundamental in the organization of an A.S.T.M. standing committee. A number of other individuals and companies who would be interested in the work of the committee were proposed at the meeting and they are to be invited to take part in the work.

H. P. Trevithick was elected chairman of the new committee, F. W. Smither, vice-chairman, and B. S. Van Zile, secretary. These three men, together with the six following members, will serve as the advisory committee:

J. B. Crowe	G. E. Hopkins
J. E. Doherty	Frederick Krassner
Ephraim Freedman	P. B. Mack

A list of the subcommittees and sections which are to be appointed is given below. The subcommittee on methods of analysis will include a number of members of the soap committee of the American Oil Chemists Society and the subcommittee is expected to review the methods of analysis developed by the A.O.C.S. committee with a view to recommending their approval by the Society.

It was indicated that the subcommittee on specifications could start its work by a critical review of existing specification requirements, and then proceed with the preparation of other specifications. The work on nomenclature may start with a consideration of definitions of different types of detergents.

The following subcommittees and sections were appointed:

SUBCOMMITTEE I ON METHODS OF ANALYSIS, J. B. Crowe, chairman

(a) Section on Soaps, M. L. Sheely, chairman
(b) Section on Sulphonated Oils, chairman to be named
(c) Section on Dry Cleaning, G. G. Gaubatz, Jr., chairman

SUBCOMMITTEE II ON SPECIFICATIONS, F. W. Smither, chairman

(a) Section on Textile Soaps, G. E. Hopkins, chairman
(b) Section on Built Soaps, Frederick Krassner, chairman
(c) Section on Straight Soaps, chairman to be named
(d) Section on Dry Cleaning, G. G. Gaubatz, Jr., chairman

SUBCOMMITTEE III ON NOMENCLATURE, Frederick Kenney, chairman

Specifications for Laminated Phenolic Products

AT the request of the Radio Manufacturers Association, the Society is undertaking the preparation of specification requirements for laminated phenolic products used in radio apparatus. This work has been assigned to Committee D-9 on Electrical Insulating Materials, and a new section entitled "Specifications for Laminated Products for Radio Use" has been organized. At the present time, the section consists of 16 members, representative of both consumers and producers of these products.

G. H. Mains, Chemical Engineer, National Vulcanized Fibre Co., is chairman of the new section with R. W. Orr, Engineering Dept., RCA Victor Division, RCA Manufacturing Co., Inc., serving as secretary. The committee met in Atlantic City on June 29, and after discussing the program of work, special subgroups were appointed to recommend the grades of material which should be standardized and the properties that should be included. This preliminary work is being undertaken in order that the standardization program may be taken up actively later in the year.

Numerous Standardization Activities Under Way

Important Standards Nearing Completion

A NUMBER of important committee standardization activities including both those nearing completion and others on which work has been started are summarized below. This information supplements reviews of committee work which are detailed in the respective annual committee reports presented at the annual meeting and will convey some idea of progress being made in a number of important fields.

FERROUS AND NON-FERROUS METALS

Four proposed specifications are being voted upon by Committee A-1 on Steel and are to be submitted to the Society in August for approval as tentative standards. The scope of the proposed specifications for high-strength structural rivet steel indicates that they cover rivet steel, which with proper riveting technique, is suitable for use with Structural Silicon Steels (A 94) and equivalent steels. Seamless steel boiler tubes for high-temperature service are covered in another of the specifications. As the result of numerous meetings and a great amount of work on the part of its subcommittee in charge, the Steel Committee will recommend proposed specifications covering nuts used in bolting for high-pressure service at temperatures up to 1100 F., and alloy steel bolting materials for such service.

Since there has been some confusion at times in ordering and inspecting plates covered by the Tentative Specifications for Wrought-Steel Plates (A 42 - 35 T), Committee A-2 on Wrought Iron will recommend changes intended to clarify certain requirements without modifying the fundamental particulars.

Detailed consideration has been given by Committee A-3 on Cast Iron to the development of definitions of terms relating to cast iron, and the committee is planning to submit a list of these definitions to the Society during the summer for publication as tentative.

Proposed tentative specifications covering malleable iron for castings made from the cupola iron process have been approved by Committee A-7 on Malleable Iron Castings and are to be submitted through the procedure of Committee E-10 on Standards for approval.

Committee A-10 on Iron-Chromium, Iron-Chromium-Nickel and Related Alloys has been developing specification requirements for 18 per cent chromium, 8 per cent nickel type castings. A letter ballot is being conducted in the committee in anticipation of submitting these proposed specifications to the Society.

Proposed revisions of four existing tentative specifications developed by Committee B-5 on Copper and Copper Alloys, Cast and Wrought, the specifications involving sheet, rods, plates and sheets, and copper silicon alloy wires, have been developed and are to be recommended to the Society, through Committee E-10. Proposed specifications covering aluminum alloy permanent mold castings will be referred to letter ballot of Committee B-7 on Light Metals and Alloys, Cast and Wrought, for approval and revisions of the Tentative Specifications for Aluminum-Base Alloy Sand Castings (B 26 - 33 T) are to be recommended.

Committee E-3 on Chemical Analysis of Metals is giving extended consideration to improvements and modifications of various chemical methods and plans to recommend as a tentative standard proposed methods of chemical analysis of steel, cast iron, open-hearth iron and wrought iron, and concurrently proposes to withdraw existing standard methods A 33 - 24, A 55 - 24, A 130 - 30 and A 64 - 27 covering respectively methods of analysis of plain carbon steel, alloy steel, sampling and analysis of rolled and forged steel products, and sampling and analysis of pig and cast iron.

BRICK; BUILDING UNITS

The Society's Committee C-3 on Brick plans to submit proposed revisions of the Tentative Specifications for Building Brick (C 62 - 35 T) and of the Tentative Methods of Testing Brick (C 67 - 35 T). At the same time a newly proposed specification covering glazed brick will be proposed for publication as tentative.

The Subcommittee on Concrete Units of Committee C-10 on Hollow Masonry Building Units is assembling available information on the properties and performance of non-load-bearing concrete units and will start the preparation of a proposed specification covering these units.

PAINT AND NAVAL STORES

An extensive program of work has been laid out by Committee D-1 on Paint, Varnish, Lacquer and Related Products, one phase of the work involving the preparation of specifications for specific complete paints and varnishes. The committee is continuing its active work on the hiding power of paints and an agreement has been reached to rewrite the existing Tentative Method of Test for Comparative Hiding Power of White Pigments (D 406 - 35 T). A change will also be proposed in the Tentative Method of Test for Comparative Hiding Power of Paints (D 344 - 32 T).

It is expected that work being carried on in the field of varnish will result during the coming year in a proposed method for determining reactivity of varnishes. Umbres, ochres and sienna are to be studied with the object of developing satisfactory specifications.

Committee D-17 on Naval Stores will work during the coming year on determining customary constants of rosin and methods for the determination of ash in order that tentative methods for these determinations can be proposed. Additional work is also contemplated on the crystallization of rosin. The committee will also begin studies of change of color of rosins on heating in order to secure definite data on the subject.

PETROLEUM PRODUCTS; COAL

Committee D-2 on Petroleum Products and Lubricants has prepared a modified viscosity-temperature chart about one-half the size of the present standard chart, D 341 - 32 T, which will be more convenient to file with correspondence. This modified chart is in course of publication. In the committee's report there were published as information, two types of kinematic viscosity methods and in order to promote the usefulness of these the committee is preparing Kinematic-Saybolt Viscosity Conversion Tables.

(Concluded on page 20)

Sectional Committee on Petroleum Products Organized

Scope Approved and Projects of Special Interest Indicated

At a meeting on July 1, in Atlantic City, of the newly organized Sectional Committee on Petroleum Products and Lubricants which functions under the procedure of the American Standards Association with the A.S.T.M. as sponsor, the report of the organization committee which had been appointed to draw up by-laws, principles of procedure, etc., was approved.

For a number of years Committee D-2 has been developing standard methods of test for petroleum products and lubricants and has published critical studies of the significance of these tests in relation to service performance of the products. All of this work is fundamental and essential in paving the way for the development of specification requirements for petroleum products. Many agencies, trade associations and industrial companies have indicated an increasing interest in specification work and in order to plan and coordinate standardization work in this field, steps were taken to organize the sectional committee. Under A.S.A. procedure, two sectional committees were functioning in this field, dealing with nomenclature and methods of testing and also specifications for fuel oils and the work of these two bodies is to be covered by the new sectional committee which will be known as A.S.A. Project Z 11. This is the same designation applying to the former sectional committee dealing with test methods.

It will be noted from the personnel of the sectional committee, listed below, that it is representative of the groups interested in petroleum products and consists of members representing national organizations and governmental departments.

An organization committee, appointed to draft the scope and outline other details which needed to be clarified before the committee could actually get under way, reported its suggestions at the meeting, these being approved. Article I on Scope of the committee by-laws clearly indicates the activities and functions which are anticipated by the committee

ARTICLE I. SCOPE

Section 1. The name of the committee shall be the Sectional Committee on Petroleum Products and Lubricants.

Sec. 2. The scope of the activities of the sectional committee shall include specifications, methods of test and nomenclature relating to crude petroleum and petroleum products (products derived in whole or in large part from petroleum) other than organic chemicals, products used medicinally, and road, paving, waterproofing, and electrical insulating materials.

Sec. 3. Within the scope as defined in Section 2, the functions of the committee shall be: (*a*) to coordinate activities of various groups; (*b*) to encourage work believed to be valuable; (*c*) to outline programs for work not adequately under way and to determine the most suitable agencies for carrying out such programs; and (*d*) to make recommendations respecting new standards and revisions of existing standards.

Sec. 4. In carrying out these functions the committee will act principally as a correlating and reviewing body. In general, it will not formulate specifications, methods of tests, and definitions of terms, but will look to the appropriate committees of cooperating organizations for the development of standards. The committee may request the appropriate organization to develop specific standards, or it may receive standards initiated by other agencies.

Sec. 5. In considering standards, however submitted, the committee will submit them to review by the organizations represented on the committee and to letter ballot of the committee members on the question of the acceptability of the standards as being national in scope and content and worthy of approval by the American Standards Association as American Standard, American Tentative Standard, or American Recommended Practice.

PERSONNEL

Members of the committee include representatives of manufacturers of automobiles and gears, representatives of railroad interests, mechanical and mining engineers and other bodies interested in the use of petroleum products and lubricants. The personnel of the committee is as follows:

American Automobile Assn., T. E. Allen
American Gas Assn., C. A. Lunn
American Gear Mfrs. Assn., C. B. Hamilton, J. H. Flagg (alternate)
American Institute of Mining and Metallurgical Engineers, K. G. Mackenzie, G. H. Taber, Jr.
American Iron and Steel Institute, John Hulst
American Oil Burner Assn., H. F. Tapp
American Petroleum Institute, R. P. Anderson, B. R. Carney, K. G. Mackenzie, J. B. Rather, T. H. Rogers, J. B. Terry
American Society of Mechanical Engineers, G. B. Karelitz, W. F. Parish, H. J. Masson (alternate), S. J. Needs (alternate)
American Society for Testing Materials, T. A. Boyd, T. G. Delbridge
American Transit Assn., E. J. Fraser
Association of American Railroads (Engineering Division), William Elmer
Automobile Mfrs. Assn., J. B. Macauley
Compressed Air Institute and Hydraulic Institute, Byron Godshall
Diesel Engine Manufacturers Assn., M. J. Reed
Electric Light and Power Group, Harold Farmer, J. O'R. Coleman
Motor Truck Association of America, T. D. Pratt
National Association of Lubricating Grease Mfrs., M. B. Chittick
National Association of Motor Bus Operators, Martin Schreiber
National Association of Purchasing Agents, F. G. Space
National Bureau of Standards, H. C. Dickinson
National Electrical Manufacturers Assn., M. H. Steinmetz, J. G. Ford, G. W. Zabel (alternate)
National Fire Protection Assn., A. H. Nuckolls, N. J. Thompson, A. R. Small (alternate)
National Petroleum Assn., MacLean Houston
Natural Gasoline Association of America, W. F. Lowe
Society of Automotive Engineers, A. L. Beall, A. W. Pope
ASA Telephone Group, L. I. Shaw, T. C. Smith (alternate)
U. S. Bureau of Mines, A. J. Kraemer
U. S. Navy Department, Officer-in-Charge, Design Division, Specification Section, Bureau of Engineering
U. S. War Department, T. W. Smith
Western Petroleum Refiners Assn., D. G. Proudfoot

The officers of the new committee are as follows: T. A. Boyd, chairman; T. G. Delbridge, vice-chairman; R. E. Hess, secretary, and an executive committee consisting of the chairman, vice-chairman and the following six members:

R. P. Anderson	C. A. Lunn
H. C. Dickinson	J. B. Rather
G. B. Karelitz	M. J. Reed

PROJECTS DISCUSSED

In order that complete information might be available to the members of the sectional committee with respect to work in progress, both of a standardization and research nature, a compilation of information based on data supplied by members of the sectional committee, was prepared and distributed to the members. Based on this extensive

information, the organization committee submitted certain projects indicated as deserving special emphasis. These recommendations were approved by the Atlantic City meeting. A special study committee is to prepare a general discussion with respect to the physical properties of lubricants under conditions of boundary lubrication such for example as oiliness, film strength, etc.

The question of Diesel lubricating oils was indicated as deserving study, and the Diesel Engine Manufacturers Assn. is to be asked to cooperate with Technical Committee B in this work. Other projects which the sectional committee indicated as important, were work on cutting oils, a special report on which is in preparation, and specifications for gasoline. In connection with the latter, what is intended to be a set of master specifications for motor gasolines is now being prepared by A.S.T.M. Committee D-2. They will represent present-day ideas of what gasolines are suitable for use in various parts of the country at different seasons of the year. The principal characteristics which will probably be included are distillation range, vapor pressure, sulfur content and A.S.T.M. octane number.

Standardization Activities

(Concluded from page 18)

The committee has prepared an article providing recommendations for a uniform practice of changing crankcase lubricating oil, which information should be of particular interest to automobile manufacturers, and in the preparation of service manuals. Consideration is being given to changes proposed for the viscosity and ignition characteristics of the present classification of Diesel fuel oils and also a number of changes in specification limits in the present requirements for fuel oils.

Committee D-5 on Coal and Coke has under development two methods for testing coal friability, that is, its resistance to breakage on handling. These two methods are termed respectively the "Tumbler Test" and "Drop Shatter Test." The former gives a measure of the inherent friability of a given coal, while the latter is applicable for testing a standard lump size (2 by 3 in. lump) of different coals and also for testing different sizes of the same coal. An important revision of the existing Standard Method of Sampling Coal (D 21 - 16) is under consideration, providing a procedure for the rapid reduction of gross samples of coal to a convenient quantity for transmittal to the laboratory.

AGGREGATES; ELECTRICAL INSULATION

Committee D-4 on Road and Paving Materials is planning to submit to Committee E-10 in August, proposed tentative methods of test for specific gravity and absorption of coarse and fine aggregate to replace existing Standard Methods D 30 and D 55 respectively.

The Methods of Testing Varnishes Used for Electrical Insulation (D 115 - 33) and Method of Testing Sheet, Tape and Molded Insulating Materials for Dielectric Strength (D 149 - 34 T) are to be revised if the recommendations of Committee D-9 are approved at the E-10 meeting in August and the committee is also proposing tentative revisions in the Standard Method of Testing Molded Materials Used for Electrical Insulation (D 48 - 33).

Structural Engineering Congress

THE second Congress of the International Association for Bridge and Structural Engineering is to be held from October 1 to 8 in Berlin. A number of reports and papers are to be presented dealing with such subjects as stresses and degree of safety in reinforced concrete structures from the designer's point of view, practical questions in connection with welded steel structures, importance of steel toughness for calculating and dimensioning steel structural work, and other subjects in this field. The reports of the Congress are to be published in German, English and French in separate volumes and special telephone installation will allow the participants in the Congress to follow the work in each of the three languages. The secretariat of the International Association, Swiss Federal Institute of Technology in Zurich, will give further information concerning the Congress.

This association has issued several publications including a preliminary report of the first Congress held in Paris in 1932, the final report which gives all the papers and extensive discussion, and the second and third volumes of "Publications" of the association comprise a large number of technical papers dealing with topical questions of steel and reinforced-concrete construction. Titles, summaries and illustration captions are printed in all three languages. Members of the association can obtain copies of the publications from the secretariat's office, and others who wish to purchase copies may obtain complete information direct from the publishers, A. G. Gebr. Leemann & Co., Stockerstr. 64, Zurich, Switzerland.

Member Talks on Specifications

AN interesting method used to stress to engineering students some of the principles involved in establishing specifications was recently tried at the University of Kansas, in Lawrence. At the request of Professor Shaad, Dean, School of Engineering, Mr. Walter Bohnstengel, an active A.S.T.M. member, who is Assistant Engineer of Tests, Atchison, Topeka and Santa Fe Railroad System, Topeka, Kans., spent two periods with the class in Industrial Administration, made up of about 75 senior engineering students, discussing "Specifications—Their Make-up and Development."

In his talks, Mr. Bohnstengel described work which his department is called upon to do, illustrating this with his own experiences on assignments. He pointed out that a great deal of work is necessary to determine the performance of a given material or piece of equipment in order that service requirements can be specified.

As an example of specification writing procedure, Mr. Bohnstengel cited the wording in the Standard Specifications for Refined Wrought-Iron Bars (A 41 - 30) comparing this with A 41 - 18 and also with the AA.R. specification M 302 - 34. He called special attention to the three line definition of wrought iron, the preparation of which had involved extended discussion in the committee.

The structure of specification committees of the American Association of Railroads and A.S.T.M. standing committees was then outlined. Mr. Bohnstengel, in concluding, told the future engineers that specifications really grow and take on new forms as service requirements or industrial developments may dictate.

Numerous Publications to Be Issued

List Includes Several Special Items

In addition to the so-called regular publications including the 1936 Book of A.S.T.M. Standards, *Proceedings*, Year Book, Index to Standards, etc., there are a number of special books which are to be published within the next few months, these having been authorized by the Committee on Papers and Publications for publication during the year.

Brief notes on some of the publications are given below for information of the members and a list of all of the publications with the special prices to members and other descriptive information will be sent in the form of an order blank to each member in September.

The special compilations of standards issued during the past few years have become of increasing significance and as indicated below, new editions of these widely used books are to be published.

REGULAR PUBLICATIONS

1936 Book of Standards.—This volume, as in the case of former editions will be issued in two parts, Part I, containing the standards pertaining to metals, Part II containing all standard specifications, tests, definitions, etc., covering non-metallic materials. With the inclusion of all standards now out to letter ballot and those published in the 1934 and 1935 Supplements, this book will be a most voluminous one. Either part is furnished the members, and members obtain both parts on the payment of $2. This book, with the 1936 Book of Tentative Standards, will give a complete file of all A.S.T.M. specifications and test methods. Distribution is scheduled for November.

1936 Proceedings.—Will include, as customarily, the technical papers, committee reports, new and revised tentative standards and tentative revisions of standards presented at the 1935 annual meeting. The inclusion of the extensive discussion of the various items adds to the value of the data given. The *Proceedings* will be sent each member late in the year.

Index to Standards and Tentative Standards.—This Index, which becomes of greater value as the number of specifications increases, will again give the latest complete references to publications where the various specifications and test methods appear. This is furnished to members and is also widely distributed on request. Members can obtain additional copies without charge.

Year Book.—Includes a list of the complete membership of the Society (name, address, company, etc.), the personnel of all A.S.T.M. committees, and other pertinent information. Furnished to members on request (see enclosed card).

1936 Book of Tentative Standards.—A compilation of *all* of the tentative standards of the Society, over 250, in their latest form. Although the current *Proceedings* will give the new tentative standards and revisions approved this year, the convenience of having in one place *all* of the A.S.T.M. tentative specifications and methods makes this book in wide demand.

Symposium on High-Strength Constructional Metals.—A special members' order blank and description is enclosed with this Bulletin. The volume will include the five papers presented at the Regional Meeting in March, with the discussion.

SPECIAL PUBLICATIONS

Symposium on Radiography and X-ray Diffraction Methods.—Consideration is being given to the publication of the twelve papers and extensive discussion comprising this symposium which was held in four sessions of the annual meeting. It is anticipated that the symposium will be issued as a special publication. The book will undoubtedly comprise several hundred pages. Special prices to members will be in effect and further announcements will be made.

1936 Marburg Lecture.—The Marburg Lecture on "Developing American Glass" delivered by Doctor Day will be included in the 1936 *Proceedings* and prior to the publication of these, reprints of the symposium will be issued.

Special Compilations of Standards.—A number of the standing committees under whose auspices have been issued special compilations of standards covering specific industrial fields have recommended that new editions of these compilations be made available during the year. All of the A.S.T.M. standard and tentative specifications and tests in the following fields will be included in the respective volumes: Petroleum products, electrical insulating materials, textile materials, rubber products, and coal and coke.

Publication on Pearlitic Malleable Iron

The Symposium on Pearlitic Malleable Iron, presented at a meeting sponsored early this year by the A.S.T.M. Cleveland District Committee, consists of material assembled from various sources and contributed by individuals interested in pearlitic malleable iron, which term is used as the best compromise for materials cast as white cast iron and subsequently treated to retain significant amounts of combined carbon. The American Foundrymen's Association cooperated closely with the committee which assembled the symposium, the committee consisting of H. M. Boylston, chairman, with Messrs. Avey, Schwartz, Wolf, Chandler, Kennedy, and Steinebach.

The introduction details the scope of the discussion with some historical information, and describes a systematic subdivision of the pearlitic malleables. There are some 16 distinct types in common use. The section of the symposium on Producers' Data gives information on typical physical properties, treatment and uses of such pearlitic malleables as high silicon, copper-bearing high manganese, spheroidized, bull's-eye, short-cycle and others.

Since the paper by E. K. Smith in 1923 on "Hardened and Tempered Malleable Castings," literature on the pearlitic malleables has been largely in patent papers. The symposium includes abstracts of a number of patents, thus presenting an idea of the method of manufacture and some of the physical properties claimed.

Copies of the symposium, comprising 32 pages, may be obtained by the members at the special price of 35 cents each.

Annual Meeting

(Concluded from page 6)

CONCRETE AND SOILS

The report of Committee C-9 on Concrete and Concrete Aggregates was featured by four rather extensive appended papers dealing with shrinkage of haydite and sand-gravel concrete, studies of soundness tests, relation between characteristics of slags and other coarse aggregates, and description of apparatus and technique for the concrete permeability tests at the Bureau of Reclamation. The paper describing the conducting of tests for soundness of fine and coarse aggregates by use of sodium or magnesium sulfate indicated that the present A.S.T.M. methods should be surrounded with further restrictions or that another procedure, less sensitive to minor variations in technique, should be adopted.

The paper describing the studies of slags and other coarse aggregates indicated that hedging the material about with complicated specification limitations was meaningless and unnecessary and that unit weight of the material is a measure of quality and a means by which only desirable slags may be accepted.

The description of tests under the joint auspices of the University of Illinois and the Society, dealing with "The Effect of Testing Speed on Strength and Elastic Properties of Concrete" showed that the secant modulus of elasticity at 90 per cent of the maximum load also increased with increase in rate of loading. This indicates that a part of the measured strain in the tests is due to creep; the amount of this creep increases with the length of time involved in the test.

A paper on "Internal Stability of Granular Materials" concludes that the behavior of granular materials under stress can be accurately and simply described in terms of the stability of elementary arches of soil particles in which the ability to sustain vertical pressure is dependent on the horitzontal thrusts supplied by adjacent particles in the mass. The relation between the vertical and lateral principal pressures depends simply upon the angle of transmission between the arch axes or lines of contact between particles and the vertical axis of reference.

ELECTRICAL INSULATING MATERIALS AND PAINT

Various problems in the field of electrical insulating materials were covered in papers at the meeting. One on "Testing for Sludge Formation in Mineral Transformer Oil" summarized results obtained in a cooperative test program of Committee D-9 to establish a sludge-testing procedure capable of exact reproduction and duplicating the chemical effects normally occurring under commercial transformer operation, as a result of which oil insoluble products, commonly called sludge, are formed. It was concluded that while the variation in sludge results obtained in different laboratories, even with the larger amounts of sludge formed, are of such magnitude that the sludge-accumulation test is at present not considered as satisfactory for standardization, definite progress has been made.

A résumé of practices and necessary precautions in conditioning of insulating materials for test was presented in another paper, with a list of useful data including approximate effects of atmospheric conditions on insulating materials. The paper stated "it is recognized that conditioning involves an added item of expense to inspection procedure, not only in the first cost of conditioning facilities, but in added time in the performance of tests. Nevertheless, conditioning in many cases is essential, for without it the establishment of requirements which will provide any appreciable measure of quality control is impossible."

While the very extensive paper on "Methods of Measuring and Determining Gloss" was presented in the session pertaining to paint, it refers to extensive work involving not only this field, but others such as textiles, ceramic products, plastics, etc. The different characteristics of appearance were discussed and about 30 gloss measuring instruments were described according to the characteristics which each measures.

BITUMINOUS MATERIALS

One of the interesting sessions of the meeting was devoted to bituminous materials, comprising six technical papers and the annual report of Committee D-8 on Bituminous Waterproofing and Roofing Materials. The paper appended to this report compared abrasion test methods for embedding of granular mineral surfacing on asphalt roofing and gave results which should be of considerable interest to producers and users of bituminous roofing. It is concluded that abrasion tests on granule surfaced roofing will readily distinguish between mechanically "well embedded" and "poorly embedded" mineral surfacing.

Another paper in this session discussed, "The Effect of Mineral Fillers on the Serviceability of Coating Asphalts" which indicated that in general durability could be improved by the addition of mineral fillers and that there is a difference in the effectiveness of various fillers. Other topics discussed covered "The Susceptibility of Asphalts to Temperature Change," "Increase in Viscosity of Asphalts With Time," "A Further Study of the Heterogeneity of Asphalt," and "Measurement of High Viscosity—A Rapid Method." As a result of tests described in this latter paper, an apparatus has been selected which it is indicated will measure viscosity over a range of 5000 to 1,000,000,000 poises.

COMMITTEE REPORTS

There were a number of very interesting papers presented at the meeting in addition to those mentioned above and certain of the committee reports included papers covering pertinent aspects of their work. Included were the reports of the Joint Committee on Effect of Temperature on the Properties of Metals, Committee C-3 on Brick, Committee B-6 on Die-Cast Metals and Alloys, a paper appended to the latter, covering "Finishing of Die Castings."

Extensive committee reports were presented by Committees A-1 on Steel, D-13 on Textile Materials, B-5 on Copper and Copper Alloys, Cast and Wrought and D-7 on Timber.

GOLF TOURNAMENT

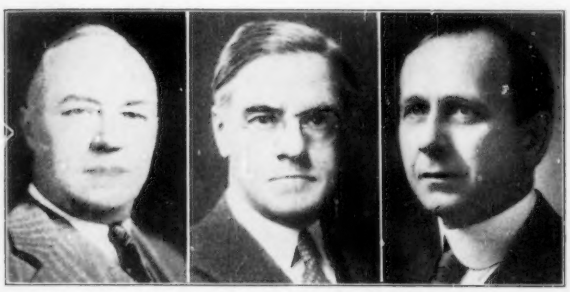
There was a good turn-out of members for the annual Golf Tournament which was held at the Seaview Golf Club, Thursday afternoon. The tournament was in the charge of a committee consisting of Harold Farmer, Chairman; G. H. Clamer, R. L. Hallett and J. G. Bragg. C. M. Loeb, Jr., won possession of the A.S.T.M. Golf Cup for a year for his low gross score. B. H. Wait took a prize for the lowest number of putts, F. M. Hartley was prize winner for low net and O. Z. Klopsch for kicker's handicap.

X. Long-Time Society Committee Members

Tenth in the Series of Notes on Long-Time Members

As a continuation of the series of articles in the A.S.T.M. Bulletin comprising notes on the outstanding activities of long-time members of the Society, there appear below outlines of the work of three additional members. In general, the men whose sketches will appear in this series will have been affiliated with the Society for 25 years or more and will have taken part in committee work for long periods. No definite sequence is being followed in these articles.

C. F. W. Rys, who was recently appointed Chief Metallurgical Engineer of the Carnegie-Illinois Steel Corp. is a graduate in metallurgical engineering of the School of Mines in Freiberg-Saxony. His early experience in steel manufacture was gained during his employment in Krupp Works in



C. F. W. Rys F. M. Farmer R. S. Greenman

Essen and before coming to America Mr. Rys made an extensive study of the iron and steel industry in England.

His first employment in the United States was with the LaBelle Iron Works, Steubenville, Ohio, in the engineering department. Mr. Rys entered the employ of the Carnegie Steel Co. in 1904 in the metallurgical department of Homestead Steel Works. In 1908, he was transferred to the general offices of the Carnegie Steel Co., becoming Assistant Metallurgical Engineer in 1910, and one year later was appointed Metallurgical Engineer in charge of the Metallurgical Department.

During his service in this capacity he was a member of numerous technical committees of national societies dealing with the development of commercial and quality specifications for the iron and steel industry. He served as President of the Association of American Steel Manufacturers during 1918 and 1919, as a member of the Executive Committee of A.S.T.M. during 1920 and 1921; also as a member of the Standards Council of the American Standards Assn., representing the Association of American Steel Manufacturers, from 1922 to 1930.

In 1930 the School of Mines in Freiberg conferred upon him the honorary degree of Doctor of Engineering.

Doctor Rys has been a member of the A.S.T.M. since 1908 and served on Committee A-1 on Steel since 1911. He was a member of several of its subcommittees and was chairman of Subcommittee V on Reinforcing Steel from 1916 to 1928. He is at present a member of Committee A-5 and of the A.S.T.M. Conference Committee with the A.S.M.E. Boiler Code Committee.

F. M. Farmer, Vice-President and Chief Engineer, Electrical Testing Laboratories, is a graduate of Cornell University, M.E., 1899. Following graduation he served for 1½ years as student engineer, General Electric Co. and then was inspector, U. S. Navy Dept., Brooklyn Navy Yard until 1903, when he joined the Electrical Testing Labs., with which he has been affiliated since. Mr. Farmer has taken a very active part in the Society work. He has been a member or the official representative of his company since 1909. He was a member of Committee D-9 on Electrical Insulating Materials, 1910-1930, chairman for six years beginning with 1920. He served on Committee D-11 on Rubber Products, 1912 to 1930, and was chairman from 1920 to 1926. (In 1930, Mr. Gordon Thompson, Electrical Testing Labs., replaced Mr. Farmer as representative on Committees D-9 and D-11.)

Mr. Farmer served on Committee E-6 on Papers and Publications for two terms, 1923-1928. He was elected a member of the Executive Committee in 1921, serving until 1923, when he became Vice-President and he was President in 1924-1925. He represents the Society on the Standards Council of the American Standards Association, on the Electrical Standards Committee, the United States National Committee, I.E.C., and other groups.

Among other organizations in which he has been specially active are the American Institute of Electrical Engineers of which he is a Director and member of Executive Committee, the American Welding Society of which he is a Past-President, and the American Standards Assn. in which he is Vice-Chairman of the Standards Council.

Russell S. Greenman, Consulting Concrete Engineer, Albany, N. Y., received his technical education in the School of Engineering, Union College, Schenectady, after which he joined the staff of the State Engineer and Surveyor of New York, being employed on surveys and construction work. In 1900, he was appointed Head of the Testing Laboratory of the Engineer's Department.

In addition to research work carried out by the laboratory, he was in charge of the inspection of concrete used on all work under the direction of the State Engineer's Dept. throughout the State of New York. In addition he did a considerable amount of research and inspection work for corporate and private interests. Since 1927, Mr. Greenman has been entirely in private practice, specializing in the production and use of concrete.

A member of the Society since 1904, he has been an active member of several A.S.T.M. committees. His membership on Committee D-4 on Road and Paving Materials dates from 1910 and he has been a member of Committee C-1 on Cement and C-9 on Concrete and Concrete Aggregates since 1914. One of his most important contributions to Society work was his service as chairman of Committee C-1 on Cement for ten years beginning with 1916.

Mr. Greenman, in addition to A.S.T.M. membership, is also affiliated with the American Concrete Institute, National Society of Professional Engineers and the Albany Society of Engineers.

New Committee Officers Elected

As a result of the elections of committee officers which take place in the even-numbered years, several new officers have been chosen by a number of A.S.T.M. committees. The men thus honored are listed below:

COMMITTEE A-3 ON CAST IRON.
Chairman: W. H. Rother, Metallurgist, Buffalo Foundry and Machine Co., Buffalo, N. Y.
Vice-Chairman: A. L. Boegehold, General Motors Corp., Research Dept., Detroit, Mich.
Secretary: H. C. Aufderhaar, Electro Metallurgical Co., Chicago, Ill.

COMMITTEE A-5 ON CORROSION OF IRON AND STEEL.
First Vice-Chairman: W. G. Kelley, Commonwealth Edison Co., Chicago, Ill.
Second Vice-Chairman: James Aston, Consulting Metallurgist, A. M. Byers Co., Pittsburgh, Pa.
Secretary: T. R. Galloway, New York Edison Co., Inc., New York City.

COMMITTEE A-6 ON MAGNETIC PROPERTIES.
Vice-Chairman: P. H. Dike, The Leeds & Northrup Co., Philadelphia, Pa.

COMMITTEE A-7 ON MALLEABLE IRON CASTINGS.
Chairman: E. K. Smith, Metallurgist, Electro Metallurgical Co., Detroit, Mich.
Vice-Chairman: H. W. Faus, Engineer of Tests, New York Central System, New York City.
Secretary: H. A. Schwartz, Manager of Research, National Malleable and Steel Castings Co., Cleveland, O.

COMMITTEE C-1 ON CEMENT.
Secretary: L. W. Walter, Inspecting Engineer, Erie Railroad Co., Jersey City, N. J.

COMMITTEE C-3 ON BRICK.
Chairman: J. W. McBurney, Senior Ceramic Chemist, National Bureau of Standards, Washington, D. C.

COMMITTEE C-4 ON CLAY PIPE.
Secretary: R. G. Scott, Assistant Secretary and Construction Engineer, Clay Products Assn., Chicago, Ill.

COMMITTEE C-8 ON REFRACTORIES.
Chairman: J. D. Sullivan, Battelle Memorial Institute, Columbus, O.
Secretary: S. M. Phelps, Director of Research and Tests, Refractories Fellowship, Mellon Institute of Industrial Research, Pittsburgh, Pa.

COMMITTEE C-10 ON HOLLOW MASONRY BUILDING UNITS.
Vice-Chairman: J. W. Ginder, Superintendent, Architectural Engineering, Engineering Section, Procurement Division, Public Works Branch, Treasury Dept., Washington, D. C.

COMMITTEE C-13 ON CONCRETE PIPE.
Chairman: E. F. Kelley, Chief, Division of Tests, U. S. Bureau of Public Roads, Washington, D. C.

COMMITTEE D-4 ON ROAD AND PAVING MATERIALS.
Chairman: F. C. Lang, Engineer of Tests, Inspection and Research, Minnesota Highway Dept., St. Paul, Minn.
First Vice-Chairman: E. F. Kelley, Chief, Division of Tests, U. S. Bureau of Public Roads, Washington, D. C.
Second Vice-Chairman: A. T. Goldbeck, Engineering Director, National Crushed Stone Assn., Inc., Washington, D. C.
Third Vice-Chairman: E. O. Rhodes, Technical Director, Koppers Products Co., Pittsburgh, Pa.

COMMITTEE D-11 ON RUBBER PRODUCTS.
Chairman: O. M. Hayden, Manager, Rubber Chemical Division, E. I. du Pont de Nemours and Co., Wilmington, Del.
Vice-Chairman: J. J. Allen, Chief Chemist, Mechanical Rubber Goods Division, The Firestone Tire and Rubber Co., Akron, O.

COMMITTEE D-13 ON TEXTILE MATERIALS.
First Vice-Chairman: G. E. Hopkins, Technical Director, Bigelow-Sanford Carpet Co., Inc., Thompsonville, Conn.
Second Vice-Chairman: R. H. Brown, Research Engineer, Parks-Cramer Co., Fitchburg, Mass.

COMMITTEE D-15 ON THERMOMETERS AND LABORATORY GLASSWARE.
Vice-Chairman: E. N. Hurlburt, Sales Engineer, Taylor Instrument Cos., Rochester, N. Y.
Secretary: J. M. Roberts, Secretary and Treasurer, Scientific Apparatus Makers of America, Chicago, Ill.

COMMITTEE D-19 ON WATER FOR INDUSTRIAL USES.
Vice-Chairman: F. N. Speller, Director, Department of Metallurgy and Research, National Tube Co., Pittsburgh, Pa.

COMMITTEE E-4 ON METALLOGRAPHY.
Chairman: J. T. Norton, Associate Professor of Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.
Vice-Chairman: M. A. Grossman, Director of Research, Carnegie-Illinois Steel Corp., Chicago, Ill.
Secretary: J. J. Bowman, Aluminum Company of America, New Kensington, Pa.

Two Prominent Members Pass

Two prominent and active members of the Society and former officers have recently died—G. C. D. Lenth, Consulting Engineer and Secretary, Clay Products Assn., and John Brunner, for many years Manager, Department of Metallurgy and Inspection, Illinois Steel Co. and recently special consulting engineer, Carnegie-Illinois Steel Corp. The Executive Committee has adopted minutes on the death of these members.

Minute on the Death of GEORGE C. D. LENTH 1882-1936

"The members of the Executive Committee of the Society record their deep sorrow in the death on May 11 of George C. D. Lenth, Consulting Engineer and Secretary, Clay Products Association. Mr. Lenth had taken an active part in Society work, had been a member since 1920 and was a member of the Executive Committee, 1931-1933. At the time of his death he was secretary of Committee C-4 on Clay Pipe and also secretary of the Chicago District Committee.

"Following his graduation from Massachusetts Institute of Technology and until 1905 he was employed by the Chicago and Northwestern Railroad. He entered the service of the City of Chicago in the Board of Local Improvements and was successively engineer of bridge repair, division engineer in charge of sewer construction, and engineer in charge of all engineering activities. From 1911 to 1921 he was assistant engineer of sewers, City of Chicago, when he was appointed to the position he held at the time of his death. He also served as consulting engineer and as a member of the Advisory Subway Engineering Commission of Chicago.

"In his passing, the Society loses an active member and one who was always ready to undertake activities in its behalf. The Executive Committee extends its heartfelt sympathy to the members of his family and acknowledges with gratitude his services unselfishly given for the benefit of the Society."

Minute on the Death of JOHN BRUNNER 1866-1936

"In the death on June 15, 1936, of John Brunner, the Society loses a member and past-officer who has been active in its work over a long period of time. A member of the Society since 1903, he served twice on the A.S.T.M. Executive Committee, from 1913 to 1915 and again from 1916 to 1918. Interested in the work of numerous Society committees he was especially active in the work of A.S.T.M. Committee A-1 on Steel.

"His early industrial work following his technical education in Sweden included the design and construction of printing machinery and bridge and steel works design and erection. Following a period of service as Chief Engineer for the City of Pittsburgh, he entered the employ of the Illinois Steel Co. with which organization he was connected for 33 years in various positions including supervisor of design and construction, research investigations and as manager of the department of metallurgy and inspection. He was an authority in the field of equipment and track structure of railroads. A life member of the American Society of Civil Engineers and American Society of Engineers, he had served as president of the Chicago Engineers' Club. He was knighted by the King of Sweden in the Royal Order of the North Star.

"The Executive Committee of the Society in recording its profound sorrow in his passing and in extending its sincere sympathy to Mrs. Brunner wishes also to record its deep appreciation of his many contributions and efforts on behalf of the Society."

PERSONALS

. . . News items concerning the activities of our members will be welcomed for inclusion in this column

D. L. EDLUND, formerly Research Associate, Massachusetts Institute of Technology, is now Research Metallurgist, Pittsburgh, Pa.

E. N. KLEMGARD, who was with the Martinez Refinery, Shell Oil Co. (California), is a Consulting Lubrication Engineer, Pullman, Wash.

G. B. WATERHOUSE, Professor of Metallurgy,, Massachusetts Institute of Technology, has been named a member of the executive committee of the American Institute of Mining and Metallurgical Engineers.

N. L. MOCHEL, Metallurgical Engineer, Westinghouse Electric and Manufacturing Co., was honored on June 20 by receiving the Westinghouse Award, Order of Merit. The Westinghouse Board of Directors alone is authorized to grant the award, which is always made by the Chairman of the Board. The citation for which the award was made to Mr. Mochel was "for distinguished service to the industry in the field of metallurgy."

E. J. EDWARDS, formerly Engineer of Tests, American Locomotive Co., was recently appointed Chief Metallurgical Engineer with the same company.

H. F. HAASE is now Research Engineer, American Can Co., Maywood, Ill.

H. E. HILTS is connected with the U. S. Bureau of Public Roads, Washington, D. C., as Senior Highway Engineer-Economist.

A. C. FIELDNER, recently appointed Chief, Technologic Branch, U. S. Bureau of Mines, was the recipient of the Honorary Degree of Doctor of Science at the recent University of Alabama commencement exercises. These were preceded by the dedication of the Southern Experiment Station of the Bureau of Mines. J. T. MACKENZIE, Chief Chemist, American Cast Iron Pipe Co., presented an address on "Metallurgical Research Problems of the Birmingham District" during the program.

J. K. BEESON is the Special Representative to Assistant General Superintendent, Pittsburgh Steel Co., Monessen, Pa.

C. F. SPEH, who was Secretary, Pine Institute of America, Jacksonville, Fla., is now Senior Technologist, Naval Stores Research Division, Bureau of Chemistry and Soils, U. S. Department of Agricuture, Washington, D. C.

E. R. LEDERER is now President, Bradford Oil Refining Co., Bradford, Pa.

G. H. FISHER, formerly Metallurgical Engineer, Carnegie-Illinois Steel Corp., Chicago, is now in the Metallurgical Department of the Great Lakes Steel Corp., Ecorse, Mich.

L. A. WAGNER, who was connected with the Cement Reference Laboratory, National Bureau of Standards, Washington, as Assistant Chemical Engineer, is now Research Chemist, Missouri Portland Cement Co., St. Louis, Mo.

J. D. YODER, who was Secretary, Cochrane Corp., Philadelphia, is now connected with The Permutit Co., New York City.

J. P. BADER, formerly Technical Adviser, The Emil Greiner Co., New York City, was recently elected President of the company.

BRADLEY STOUGHTON, who was Director, Curriculum of Metallurgical Engineering, has been made Dean, College of Engineering, Lehigh University.

H. A. SCHWARTZ, Manager of Research, National Malleable and Steel Castings Co., Cleveland, received the Honorary Degree of Doctor of Engineering at the fifty-second commencement, June 1, of Case School of Applied Science. Doctor Schwartz also delivered the annual Sigma Xi lecture before the Case Chapter, May 29, on "Our Debt to Josiah Willard Gibbs."

P. A. MILLS, formerly Manager, Pittsburgh Office, Moody Engineering Co., is now on the Technical Staff, Columbia Chemical Division, Pittsburgh Plate Glass Co., Barberton, Ohio.

A. F. REICHMANN was recently made Vice-President, American Bridge Co. He formerly was Assistant Chief Engineer.

J. H. ZIMMERMAN recently became affiliated with The Linde Air Products Co., Newark, N. J., as Development Engineer.

E. M. JENKINS, who was Engineer, Research Laboratories, Johns-Manville Corp., is now Vice-President, Selective Residential Construction, Inc., Scarsdale, N. Y.

G. C. GEWECKE is now Assistant Sanitation Engineer, C. MacCallam, Consulting Engineer, Mineola, N. Y.

H. A. MERENESS, who was Field Secretary, National Federation of Textiles, Inc., New York City, is now Economist, Department of Labor, Washington.

J. H. HERRON, President, James H. Herron Co., Cleveland, Ohio, has been nominated for President of The American Society of Mechanical Engineers for 1937.

MIKE A. MILLER, formerly a Student, University of Michigan, Ann Arbor, is now a Member of the Physical Chemistry Research Staff, Aluminum Research Labs., Aluminum Company of America.

PERCY H. WALKER, formerly Assistant Chief, Chemistry Division, National Bureau of Standards, is now Chief, Chemistry Division. G. E. F. LUNDELL who was Principal Chemist at the Bureau has been made Assistant Chief of the Chemistry Division.

A. R. WILSON, Engineer of Bridges and Buildings, The Pennsylvania Railroad Co., Philadelphia, was elected president of the American Railway Engineering Assn. at its annual meeting held in Chicago.

J. M. LESSELLS, Consulting Mechanical Engineer, Swarthmore, Pa., has been appointed Associate Professor of Mechanical Engineering at the Massachusetts Institute of Technology.

ARTHUR SCHRODER, Director of Technical Service, Chicago Apparatus Co., is in charge of the Industrial Laboratory Division, the opening of which has been announced.

H. M. ST. JOHN, Chief Metallurgist, Detroit Lubricator Co., has been elected Chairman of the Advisory Committee of the Non-Ferrous Division, American Foundrymen's Assn., and H. J. ROAST, Roast Laboratories, Registered, has been chosen Vice-Chairman, each to serve for a term of two years.

The following A.S.T.M. members were elected to office in the Institute of Metals Division of the A.I.M.E.:

E. H. DIX, JR., Chairman; A. J. PHILLIPS, Vice-Chairman; R. F. MEHL, Vice-Chairman; and W. H. FINKELDEY, member of Executive Committee. J. L. CHRISTIE, a past-chairman of the Institute, was re-elected a Director of the A.I.M.E.

I. S. LATIMER, formerly Metallurgical Engineer, Follansbee Bros. Co., is now Chief Metallurgist, Rotary Electric Steel Co.

NECROLOGY

We announce with regret the death of the following members and representatives:

R. W. DOERING, Vice-President and Works Manager, Frost Steel and Wire Co., Ltd., Hamilton, Ont., Canada. Member since 1934.

WILLIAM G. GOSS, Technical Service Division, Kimble Glass Co., Chicago, Ill. Member since 1933.

A. H. HOOKER, Hooker Electrochemical Co., Niagara Falls, N. Y. Member since 1906.

EDWARD PIERCE HULSE, Chairman, Graphic Arts Division, The American Society of Mechanical Engineers, New York City. Member since 1926.

ELWOOD T. ICKES, Special Representative, Columbia Steel and Shafting Co., Pittsburgh, Pa. Member since 1906. Mr. Ickes was a member of Committee A-1 on Steel and had served as the Society's representative on the former Joint Committee on Screw Stock Specifications.

A. C. JONES, Research Engineer, Lebanon Steel Foundry, Lebanon, Pa. Mr. Jones was a member of Committees A-1 and A-10.

C. G. EMIL LARSSON, Chief Consulting Engineer (Retired), American Bridge Co., New York City. Member since 1903. Until his retirement Mr. Larsson was an active member of Committee A-1 on Steel.

MELDON H. MERRILL, Western Manager, Robert W. Hunt Co., San Francisco, Calif. Member since 1935.

D. J. NEVILL, Chief Engineer, Stearns-Roger Manufacturing Co., Denver, Colo.

CHARLES L. STROBEL, Consulting Engineer (Retired), Chicago, Ill. Member since 1898. Mr. Strobel was a Life Member of the Society.

NEW MEMBERS TO JULY 20, 1936

The following 85 members were elected from April 24 to July 20, 1936:

Company Members (19)

American Concrete Expansion Joint Co., R. C. Yeoman, Research Engineer, 221 N. La Salle St., Chicago, Ill.

American Hot Dip Galvanizers Assn., Inc., S. J. Swensson, Secretary-Treasurer, 903 American Bank Bldg., Pittsburgh, Pa.

Betz, W. H. & L. D., R. T. Sheen, Technical Director, 235 W. Wyoming Ave., Philadelphia, Pa.

Bristol Co., The, G. T. Evans, General Staff Engineer, Waterbury, Conn.

Cattie & Brothers, Inc., Joseph P., J. P. Cattie, President, Gaul and Letterly Sts., Philadelphia, Pa.

Doble Engineering Co., F. C. Doble, Consulting Engineer on Electrical Insulation, Medford Hillside, Boston, Mass.

Forging Manufacturers' Assn., Inc., W. J. Parker, Secretary, 7 E. 44th St., New York City.

Kelvinator Corp., G. V. Pollard, General Works Manager, 14250 Plymouth Road, Detroit, Mich.

Marshall Field & Co., T. W. Edwards, Industrial Engineer, Merchandise Mart, Chicago, Ill.

Parker-Kalon Corp., M. Slifka, Assistant Secretary, 200 Varick St., New York City.

Republic Flow Meters Co., A. F. Spitzglass, Vice-President in Charge of Engineering, 2240 Diversey Parkway, Chicago, Ill.

Rome Cable Corp., C. H. Ellis, Manager, Rubber Division, 330 Ridge St., Rome, N. Y.

Scientific Glass Apparatus Co., William Geyer, Proprietor, 49 Ackerman St., Bloomfield, N. J.

Societe Le Pyrex, Director General, 8 Rue Fabre d'Eglantine, Paris 12e, France.

Superior Sheet Steel Co. Division, The, Continental Steel Co., W. R. Grimsley, Superintendent, Canton, Ohio.

Synthane Corp., S. W. Place, Engineer, Oaks, Pa.

Teletype Corp., W. H. Pagenkopf, Engineer of Manufacturing, Planning and Development, 1400 Wrightwood Ave., Chicago, Ill.

Ternstedt Manufacturing Division, General Motors Corp., C. F. Nixon, Chemical Engineer, 6307 W. Fort, Detroit, Mich.

Vulcan Detinning Co., The, A. C. Buttfield, Vice-President, Sewaren, N. J.

Individual and Other Members (63)

Ambrose, H. A., Research Chemist, Gulf Research and Development Corp., P. O. Box 2038, Pittsburgh, Pa.

Avery, H. S., Metallographist, Metallurgical Laboratory, American Brake Shoe and Foundry Co., Mahwah, N. J.

Ayres, Eugene, Staff Chemist, Gulf Research and Development Corp., P. O. Box 2038, Pittsburgh, Pa.

Bardin, I. P., Technical Director, Stalin Metallurgical Plant, Stalinsk, West Siberia, U.S.S.R. (Russia.)

Bates, H. J., Metallurgist, Fairfield Manufacturing Co., Lafayette, Ind.

Baum, L. A. H., Chemist, U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh, Pa.

Bernhard, R. K., Engineer, Baldwin-Southwark Corp., Eddystone, Pa.

Bernthal, A. F., Metallurgist, Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.

Boyd, G. D., Vice-President, Wallingford Steel Co., Wallingford, Conn.

Briggs, Clay, Chief Engineer, Empire Oil and Refining Co., Bartlesville, Okla.

Brockway, G. S., Civil Engineer, 425 Sunset Road, West Palm Beach, Fla.

Brodersen, H. T., Chief Chemist, Johns-Manville Products Co., Pittsburg, Calif.

Cermak, J. J., Assistant Treasurer, Structural Clay Products, Inc., 1427 Eye St., N. W., Washington, D. C.

Chiao-Tung University, J. U. Lag, President, 1954 Avenue Haig, Shanghai, China.

Curran, J. J., Research Metallurgist, Walworth Co., Greensburg, Pa.

Day, H. L., Metallurgist, Ingersoll-Rand Co., Phillipsburg, N. J.

de Forest, A. V., Professor of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.

Donaldson, R. A., Metallurgist, Woodward Iron Co., Woodward, Ala.

Evans, J. M., Chief Engineer, Evans Products Co., 2428 Union Guardian Building, Detroit, Mich.

Hanna, W. S., Faculty of Engineering, Egyptian University, Giza, Cairo, Egypt.

Hitchcock, L. B., Consulting Chemical Engineer, Hooker Electro-chemical Co., Niagara Falls, N. Y.

Holdt, Charles, General Chemical Superintendent, Brasil Oiticica, S. A., 94 Avenue Barão de Teffé Rio de Janeiro, Brazil.

Horrocks, Herbert, Chemist, American Type Founders Inc., 200 Elmora Ave., Elizabeth, N. J.

Howard, J. A., Plant Engineer, Frost Steel and Wire Co., Ltd., Hamilton, Ont., Canada.

Howe, A. R., Vice-President, Ludlow Manufacturing Associates, 211 Congress St., Boston, Mass.

Hyde, L. K., Engineer, O. S. Peters, Washington, D. C. For mail: 4705 Forty-ninth St., N. W., Washington, D. C.

Ivie, W. B., Concrete Technician, Corps of Engineers, U. S. A., U. S. Engineer Office, Clarksville, Mo.

Jacobsen, A. E., Chemist, Titanium Pigment Co., P. O. Box 58, South Amboy, N. J.

Jenks, D. H. Jr., Ashland Refining Co., Inc., Ashland, Ky.

Johnson, G. H., Director of Research, American Institute of Laundering, P. O. Drawer 1187, Joliet, Ill.

Joos, C. E., Chemical Engineer, Cochrane Corp., Seventeenth St. below Allegheny Ave., Philadelphia, Pa.

Krouse, G. N., Mechanical Engineer, Aluminum Research Laboratories, Aluminum Co. of America, New Kensington, Pa.

Kuhn, H. C., Chief Inspector, Sinclair Refining Co., East Chicago, Ind.

LaLiberte, P. C., Mechanical Engineer, Cutler-Magner Co., 1116 Fidelity Building, Duluth, Minn.

Lima, D. O., Testing Engineer, Oklahoma Gas and Electric Co., P. O. Box 1498, Oklahoma City, Okla.

Lodewick, S. W., Manager, Valley Refining Co., P. O. Box 660, Roswell, N. Mex.

Miller, R. W., Technical Representative, Columbia Alkali Corp., Barberton, Ohio.

Newark, City of, Department of Public Affairs, J. W. Costello, Chief Engineer, City Hall, Newark, N. J.

Nugent, F. V., Chief Analyst, Boston Blacking and Chemical Co., Third St., East Cambridge, Mass.

Patterson, E. B., Technological Service, Arthur H. Thomas Co., W. Washington Square, Philadelphia, Pa.

Penrod, R. E., Engineer of Tests, Cambria Plant, Bethlehem Steel Co., Johnstown, Pa.

Philadelphia School District, The Board of Public Education, I. T. Catharine, Superintendent of Buildings, Parkway at Twenty-first St., Philadelphia, Pa.

Pinner, W. L., Chief Chemical Engineer, Houdaille-Hershey Corp., 2660 East Grand Boulevard, Detroit, Mich.

Puglia, J. F., Inspector of Road Construction, 581 W. 177th St., New York City.

Renne, J. A., Chemist, Peabody Coal Co., Chicago, Ill. For mail: 801 W. Vine St., Taylorville, Ill.

Rex, B. P., Bituminous Sales Engineer, The General Crushed Stone Co., 42 Seneca St., Geneva, N. Y.

Rich, H. M., Salesman, Hickman-Williams & Co., Inc., 1203 Ford Building, Detroit, Mich.

Ritter, E. O., Robert W. Hunt Co., 251 Kearny St., San Francisco, Calif.

Robinson, A. A., Chemist, Wilson and Co., 4100 S. Ashland Ave., Chicago, Ill.

Robinson, E. A., Manager, The Robinson Materials Testing Co., 80 Westmoreland Ave., White Plains, N. Y.

Roff, E. L., Metallurgist, Carnegie-Illinois Steel Corp., South Works, 3426 E. Eighty-ninth St., Chicago, Ill.

Rolf, Raymond, Metallurgical Engineer, The Lakeside Steel Improvement, 5418 Lakeside Ave., Cleveland, Ohio.

Rudow, C. M., Consulting Engineer, 228 N. La Salle St., Chicago, Ill.

Schoffstall, C. W., Director of Laboratory, Marshall Field and Co., Chicago, Ill.

Stanley, C. M., Consulting Engineer, Young and Stanley, Inc., 211 Iowa Ave., Muscatine, Ia.

Stroh, Donald, President, Stroh Die Moulded Casting Co., 525 E. Michigan St., Milwaukee, Wis.

Taylor, G. H., Chief Inspector, American Hoist and Derrick Co., 63 S. Robert St., St. Paul, Minn.

Turner, J. L., Director of Research, Titanium Pigment Co., P. O. Box 58, South Amboy, N. J.

Vesce, V. C., Chief Chemist, Harmon Color Works, Inc., 361 Harmon St., Brooklyn, N. Y.

Watkins, J. S., Consulting Engineer, 606 Citizens Bank Building, Lexington, Ky.

Wolcott, L. C., Packard Electric Corp., Warren, Ohio.

Wood, R. T., Metallurgist, American Magnesium Corp., 2210 Harvard Ave., Cleveland, Ohio.

Zinzow, W. A., Chief Physicist, Bakelite Corp., 230 Grove St., Bloomfield, N. J.

Junior Members (3)

Crehan, W. J., The St. Clair Rubber Co., Marysville, Mich. For mail: 1518 Seventh St., Port Huron, Mich.

Garriott, F. E., Chemist, J. D. Adams Co., 217 S. Belmont St., Indianapolis, Ind.

Hayashi, Chihiro, Engineer, Mitsubishi Electric and Manufacturing Co., Wadamisaki, Kobe, Japan.